DOMINION OF CANADA
DEPARTMENT OF AGRICULTURE
DOMINION EXPERIMENTAL FARMS

EXPERIMENTAL STATION

SWIFT CURRENT, SASK.

REPORT OF THE SUPERINTENDENT

J. G. TAGGART, B.S.A.

FOR THE YEAR 1930

General view of experimental plots.

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DOMINION EXPERIMENTAL STATION, SWIFT CURRENT, SASK.

REPORT OF THE SUPERINTENDENT, J. G. TAGGART, B.S.A.

NOTES ON THE SEASON

Work on the land was started early in April. Tillage and seeding operations proceeded rapidly under favourable weather and soil conditions until interrupted by a week of wet weather at the end of April. When seeding was resumed in early May the work was soon completed and all spring grain crops germinated quickly. Then followed four weeks of dry weather with heavy and almost continuous wind. While the wind caused no damage to crops on the Station, several farmers in the district had large areas of summer-fallow crop entirely blown out. In some cases the land was reseeded to oats or flax; in others the blown out area was summer-fallowed. Two good rains fell in the month of June. Grain crops which had not been too severely damaged by wind made rapid progress and promised excellent yields. However, from the end of June onward there was no rain of any value. Subsoil moisture reserves were small and by mid-July were entirely exhausted. The result was a wheat crop that was low in yield and light in weight. Crops of oats and barley suffered even more than the wheat.

Hay crops were mostly poor due partly to poor stands obtained from the 1929 seeding and partly to the dry windy weather in May.

Harvesting by all methods common to the district was begun early and much of the crop was safely stored by September 22, when all harvest work was stopped by a rain and snow storm amounting to two inches of precipitation. Another snow storm occurred on October 14 which further delayed completion of harvesting. During the latter part of October and throughout the remaining months of the year almost ideal weather prevailed. Cattle and horses have been able to run at large, thereby conserving the limited feed supplies for spring work.

DATES OF FARM OPERATIONS, 1930

Operations	Began	Finished
Work on hand (first and last dates)	April 3	Oct. 14
Seeding of wheat	April 8	May 20
Seeding of oats	May 8	May 23
Seeding of corn	May 23	May 26
Seeding of fall rye	Aug. 15	Aug. 20
Spring ploughing	April 18	May 13
Ploughing summer-fallow	May 13	June 12
Cutting hay	June 20	July 21
Cutting fall rye	July 25	Aug. 4
Cutting wheat	Aug. 4	Sept. 3
Cutting oats	Aug. 7	Aug. 22
Cutting corn	Sept. 10	Sept. 12
Operating combine	Aug. 9	Nov. 6
Threshing	Sept. 4	Sept. 9
Fall ploughing	Oct. 4	Oct. 14

Month	Temperature			Precipitation ten inches snow=one inch rain	Evaporation	Sunshine	Wind total miles
	High	Low	Mean				
	°F	°F	°F	in.	in.	hr.	
January	26	−40	−3·9	0·25	.....	73·3	.....
February	48	−18	23·6	0·07	.....	94·0	.....
March	56	−13	25·5	0·13	.....	188·6	.....
April	71	11	45·6	1·44	.....	227·4	.....
May	79	25	49·2	0·39	6·487	247·7	7,525
June	89	33	58·3	3·77	5·877	239·5	6,376
July	95	43	66·3	0·71	7·436	316·4	4,308
August	94	28	67·2	1·33	7·932	271·7	4,892
September	86	24	53·2	2·41	4·183	209·0	4,739
October	67	2	36·1	0·55	.....	167·0	.....
November	65	−8	28·9	0·21	.....	118·5	.....
December	55	−1	26·6	0·31	.....	102·6	.....
Totals	.....	.....	.....	11·57	31·915	2,255·7	27,890

Last spring frost.....May 26.
First fall frost.....Aug. 31.
Frost-free period.....97 days.
Rainfall during April, May, June, July.....6·31 inches.

ANIMAL HUSBANDRY

HORSES

The number of work horses remains at sixteen and the distribution of work between tractor and horses has been much the same as outlined in last year's report. Due to advancing age it will soon be necessary to dispose of some of the present work horses. However, all horses are now in good condition as a result of a run of more than two months in the stubble fields. The idle horses are being wintered on oat straw and a small grain ration.

CATTLE

Since the last report was submitted a change in the cattle breeding program has been brought into effect.

For some years past small herds of both Holsteins and Shorthorns have been maintained. With the limited pasture area and small feed supplies available it was found necessary to keep the numbers in both herds at such a low point that there was little opportunity for selection and herd improvement. It was also difficult to keep two bulls of the quality necessary to effect any real improvement in the two herds. For these reasons it was decided to dispose of the Holsteins and devote the entire effort to building up a herd of dual purpose Shorthorns. The decision to retain the Shorthorns rather than the Holsteins was based on the fact the demand for breeding stock was largely for the Shorthorn breed. With the exception of a few specialized dairymen, who keep Holstein cattle, practically all the farmers of the district surrounding this Station prefer cattle of the Shorthorn type, especially if the cows can be depended upon to produce fair quantities of milk and calves of good beef type.

As a start toward the production of breeding stock which will meet the needs of the farmers, we have been fortunate in securing from the Scott Station an aged bull with a well established breeding record. The herd has also been materially strengthened by the purchase of four females from the herd of

Alexander McLaren, Buckingham, Quebec. Two of these are mature cows which have milk records of 9,000 pounds and 11,264 pounds per year. The herd now consists of the bull described above, thirteen females of breeding age and five heifer calves.

SWINE

Due to the drought and consequent feed shortage of 1929 it was thought inadvisable to materially increase the numbers of swine. However, the breeding stock has been maintained and an effort has been made to supply the keen demand for breeding stock which has arisen during recent months. Four boars and nine young sows have been sold for breeding purposes during the year. In addition thirty-one pigs were sold for slaughter. The number sold for slaughter was increased by reason of the fact that the sows were entered in the advanced registry scheme which requires that four pigs from each litter be submitted to a slaughter test. Advanced registry requirements have not yet been fully met by the two sows entered, hence a full report on this project cannot be made at this time.

FIELD HUSBANDRY

Rotation and cultural work in this Division has been somewhat disrupted this year by the construction of the Neidpath extension of the Canadian National Railways across the northeast quarter of the Station as well as by a change in the program of work on the rented land. On the Station the seven-year rotation and the rye fallow rotation had to be abandoned as a result of the railway construction. With the completion of this branch line into Swift Current which is projected for the early spring of 1931, it is probable that a small area of our plot land will be cut off but the loss in this direction will be much less than would have been the case had the original surveys been followed.

The change in program on the rented land was the result of two causes. Late in 1929 an arrangement was made with the city of Swift Current whereby we received from them eighty acres of virign land adjoining the Station on the west in exchange for a similar area on the south. The latter is now being used as an intermediate aerodrome by the Department of National Defence. The area required for this purpose has been seeded down to grass and the entire quarter has been fenced. The experimental work on the remaining 80 acres of this quarter has been reorganized largely with a view to securing information on wire worm control. This course was adopted because during the past six years only one crop has been produced on this land, without serious wire worm damage. Results of experiments were proving valueless because the outcome was determined by the extent of the wire worm damage regardless of other factors upon which experimental data were being sought. Since the same type of damage is more or less prevalent over a wide area in southwestern Saskatchewan, it was clear that the type of experimental work would have to be changed in order to secure information that might contribute to the solution of the problem generally.

At the time that the change in program was decided upon, we were fortunately able to secure the ready and able co-operation of the officers of the Entomological Branch in carrying out a joint project on wire worm control. All entomological work is handled by that Branch while we do the work of tillage, seeding, harvesting and recording of agricultural data.

With the discontinuance of the cultural work on the larger areas for the reasons explained above, it was decided after consultation with the Dominion Field Husbandman to lay down a more comprehensive series of cultural and rotation studies on small plots with a view to bringing the work under better

control and thereby secure more accurate information on these practices on wire worm and weed infested land. The work was begun in the spring of 1930 in accordance with the plans. Due to the fact that the rotation plans will not be in full effect until the spring of 1931 there are no useful data for publication in this report.

ROTATIONS

In the following two tables there are shown summaries of the two cropping plans in which wheat is the only crop grown. In the one case fallow is alternated with wheat and in the other one-third of the land is in fallow and two-thirds in wheat.

THREE-YEAR ROTATION—FALLOW, WHEAT, WHEAT

Summary of yields, value and profit and loss per acre

Crop	Yield per acre		Value	Cost of production	Profit or loss	
	1930	Average 7 years			1930	Average 7 years
	bush.	bush.	$	$	$	$
Fallow						
Wheat	16·3	23·3	9 75	12 93	−3 18	10 93
Wheat	8·2	14·9	4 90	10 79	−5 89	4 30
Totals for rotation			14 65	23 72	−9 07	14 16
Average per acre			4 88	7 91	−3 02	4 72

TWO-YEAR ROTATION—FALLOW, WHEAT

Summary of yields, value and profit and loss per acre

Crop	Yield per acre		Value	Cost of production	Profit or loss	
	1930	Average 8 years			1930	Average 8 years
	bush.	bush.	$	$	$	$
Fallow						
Wheat	10·0	19·3	6 00	15 33	−9 33	6 11
Totals for rotation			6 00	15 33	−9 33	6 11
Average per acre			3 00	7 67	−4 67	3 05

The summaries show that in 1930 there were losses on all the crops grown, but the averages show profits of $3.05 and $4.72 per acre for the two- and three-year rotations respectively. In comparing these rotations it is important to note that in the alternate wheat and fallow plan the average yield of wheat on fallow is 19·25 bushels per acre, while in the three-year rotation the average yield of wheat on fallow is 23·3. This difference in yield is undoubtedly due to the inferiority of the land on which the two-year rotation is located. If the yields of wheat on fallow were the same in the two rotations there would be very little difference between them in net profit.

Since so much consideration is being given to cost of production at the present time, it may be of interest to examine into the methods used in calculating cost and profit or loss as shown in the above table.

The different rotations occupy different areas and have different proportions of summerfallow, hence the only basis of comparison is the cost per acre. Records are kept of all man, horse and tractor work done on each field of each rotation. Likewise all other expenditures chargeable to each rotation are

recorded. Land rent and the use of machinery are also included. The following list shows the cost factors actually used:—

Rent of land and taxes	per acre	$2 40
Seed grain	per acre	1 00
Twine	per pound	0 14
Machinery	per acre	1 35
Man labour	per hour	0 30
Horse labour (one horse)	per hour	0 08
Tractor (not including operating costs)	per hour	0 50
Gasoline	per gallon	0 27
Lubricating oil	per gallon	1 25
Threshing wheat	per bushel	0 12
Combining	per acre	2 00

Return Values of Products

Wheat	per bushel	$0 60

SEVEN-YEAR ROTATION

The seven-year rotation was originally designed to provide as far as possible against drought and soil drifting. Hay and corn were included to provide a supply of fodder, while wheat and rye were the cash crops. The sequence of crops was: Corn, wheat, hay, hay and fallow, wheat, fallow, fall rye. In seven years ending with 1929 this rotation showed average profit of $4.11 per acre for the entire area. On adjoining land a three-year rotation of fallow, wheat, wheat showed an average profit of $6.32. On both areas the land was reasonably free from weeds and good stands of the grain crops were always obtained. The chief difficulty with the seven-year rotation lay in the frequent failure of the hay crops (sweet clover, western rye grass and brome grass) to make good stands. The corn crop also failed completely in three years out of the seven. Failure of the corn and hay crops caused the land to be summer-fallowed in those years, thereby raising the yield of the succeeding wheat crop. In some instances the increased wheat crop more than offset the loss of corn or hay.

TWO-YEAR ROTATION—FALLOW, FALL RYE

This method of cropping represents an extreme attempt to overcome the effects of drought and soil drifting. It has proven entirely unsuitable and uneconomic as compared with alternate wheat and fallow or wheat, wheat and fallow. The yield per acre of the rye crop on fallow has been about the same as wheat but the low return value of the rye crop has often made it unprofitable. Over the seven-year period the crop barely met the expense of growing it.

CULTURAL EXPERIMENTS

PACKER EXPERIMENT ON MARQUIS WHEAT

This experiment was started in 1929 to check up field trials of packers which had then been going for eight years and had not produced any very definite results either for or against the use of packers. In the present experiment only one type of packer is used. On a range of twelve plots of fallow alternate plots are packed and not packed after seeding. The same procedure is followed on ploughed stubble land. In 1929 it was observed that packed plots showed slightly earlier emergence and a more uniform stand throughout the season. Yields from packed plots were slightly higher than from unpacked plots. In 1930 little difference of any sort could be observed and yields averaged about the same from both series.

PACKER EXPERIMENT ON MARQUIS WHEAT

1-50-acre plots — Replicated five times

Treatment	1930 Crop		
	Yield per acre	Weight per measured bushel	Average yield 2 years
	bush.	lb.	bush.
Sown on fallow, cultipacked	18·4	57·9	18·2
Sown on fallow, not packed	20·0	58·4	18·3
Sown on stubble land, cultipacked	8·2	49·8	7·0
Sown on stubble land, not packed	8·7	50·2	7·2

SUMMER-FALLOW TREATMENTS FOR WHEAT PRODUCTION

When six or seven-year averages are compared it will be seen that different methods of summer-fallowing have given remarkably uniform yields. On the triplicated fiftieth-acre plots the yields vary from 22·6 bushels to 24·6 bushels per acre, an extreme difference of two bushels which is quite within the error involved in such work. On the field areas one treatment (fall ploughed fallow) is somewhat below the others in yield. Otherwise the results from the fields closely resemble those from the plots.

Regardless of the depth of tillage or kind of implement used the one point common to all treatments has been that weeds have been kept under control.

Under the conditions prevailing at this Station there is no apparent advantage in tilling the summer-fallow to a greater depth than is necessary to kill the weeds. It should be noted that there were no perennial weeds on any of the land under these experiments. The soil varies from a fine sandy loam to a clay loam. With respect to soil type and weeds the conditions of the experiment are typical of a large part of Southwestern Saskatchewan. There can be no doubt that in considering methods of summer-fallowing, the emphasis should be placed on weed control rather than on kind or depth of tillage. The selection of implements and time of working should be such as to most effectively kill weed growth with the least possible effort.

RESULTS FROM DIFFERENT SUMMER-FALLOW TREATMENTS FOR WHEAT PRODUCTION

1/50 acre Plots triplicated

No.	Treatment	Yield per acre	
		1930	Average 6 years
		bush.	bush.
1	Fall ploughed, cultivated in fallow year	16·7	24·4
2	Fall disked, cultivated in fallow year	14·6	23·6
3	Cultivated as required to July 15, ploughed and left untilled	17·9	24·0
4	Ploughed June 10, 6 inches, cultivated in fallow year	19·0	24·2
5	Cultivated only in fallow year	17·6	24·2
6	Ploughed June 10, 6 inches, 5 pounds sweet clover per acre sown with 2nd year wheat	19·8	24·3
7	Spring burned, disked, ploughed June 10, cultivated as required	14·3	23·9
8	Disked early, ploughed June 10, cultivated as required	14·1	23·8
9	Ploughed June 10, 4 inches, cultivated as required	16·4	24·6
10	Ploughed June 10, 8 inches, cultivated as required	16·3	24·0
11	Ploughed June 10, 6 inches, subsoiled 4 inches, cultivated as required	17·8	23·7
12	Ploughed May 15, cultivated as required	17·2	23·8
13	Cultivated only both fallow and stubble crops	17·1	22·6

RESULTS FROM DIFFERENT SUMMER-FALLOW TREATMENTS FOR WHEAT PRODUCTION

Field	Crop	Treatment	Yield per acre	
			1930	Average 7 years
			bush.	bush.
1	Wheat....	Fall ploughed, cultivated during fallow year	12·5	19·2
2	Wheat....	Fall disked, cultivated during fallow year	12·5	22·3
3	Wheat....	Cultivated only during fallow year	14·5	22·7
4	Wheat....	Cultivated till July 15, ploughed	17·0	22·8
5	Wheat....	Ploughed 6 inches deep June 15, cultivated	23·0	23·6
6	Wheat....	Ploughed before June 15, cultivated	18·0	22·3

STUBBLE TREATMENTS FOR WHEAT PRODUCTION

The results of the stubble treatment experiments resemble those of the fallow treatments in that it is impossible to relate yields to depth or amount of soil tillage. In the stubble treament plots and fields the degree of weed control attained by the different treatments has always been the determining factor in yield up to the limits allowed by the rainfall. Russian thistles are the most prevalent weeds on this land, hence ploughing and particularly spring ploughing has usually produced higher yields than disking for the reason that ploughing is much more effective in controlling this particular weed. Depth of ploughing has not been important. Whenever a clean running burn could be obtained, as on combine stubble, results have been good.

The one way disk has not been included in these experiments in the preparation of stubble land for wheat, for the reason that this implement had not been introduced at the time the experiments were laid down. However, provision is being made to have this implement used on the experimental areas in future. On other stubble land the one-way disk has given very satisfactory weed control with correspondingly good yields. When using this or other shallow tillage methods for second crop wheat our experience indicates that extremely early work on the stubble is not desirable. Better weed control is generally obtained by deferring the tillage work until such a time that the seed drill may follow almost immediately after the tillage implement.

RESULTS FROM DIFFERENT STUBBLE TREATMENTS FOR WHEAT PRODUCTION

Field Areas

Field	Crop	Treatment	Yield per acre	
			1930	Average 8 years
			bush.	bush.
1	Wheat....	Fall ploughed, harrowed, seeded and harrowed	8·7	16·5
2	Wheat....	Fall disked, spring ploughed, harrowed, seeded and harrowed	10·5	18·4
3	Wheat....	Spring ploughed, harrowed, seeded and harrowed	11·1	18·7
4	Wheat....	Previous crop cut with combine; spring burned and seeded	13·8	18·3
5	Wheat....	Previous crop cut with combine; spring burned, disked, seeded	13·7	19·4
6	Wheat....	Spring burned, disked, seeded, harrowed	9·8	17·8
7	Wheat....	Spring burned, ploughed, harrowed, seeded, harrowed	6·3	18·8
8	Wheat....	Spring disked, seeded, harrowed	2·9	14·7

NOTE.—The fallow crop in this experiment averaged 13·4 bushels per acre in 1930. Average for 8 years equals 30·2 bushels per acre.

RESULTS FROM DIFFERENT STUBBLE TREATMENTS FOR WHEAT PRODUCTION

1/50-acre plots

No.	Treatment	Yield per acre	
		1930	Average 7 years
		bush.	bush.
1	*Fall ploughed, spring harrowed, sown	3·4	16·5
2	Fall disked, spring ploughed, harrowed, sown	6·2	17·1
3	Spring ploughed, 4 inches, harrowed, sown	5·1	17·7
4	Spring burned, disked, harrowed, sown	6·7	18·3
5	Spring burned, spring ploughed, harrowed, sown	5·0	16·7
6	Spring disked, harrowed, sown	3·7	16·3
7	Spring burned, sown	3·4	16·3
8	Sown in stubble	2·3	11·8
9	Spring burned, ploughed 7 inches, harrowed, sown	8·2	18·5
10	Spring burned, ploughed 4 inches, subsoiled 6 inches, harrowed, sown	7·5	19·0
11	Fall burned, spring ploughed, 4 inches, harrowed, sown	8·0	18·8
12	Fall burned, spring disked, harrowed, sown	7·5	19·6
13	Spring burned, cultivated, harrowed, sown	5·1	17·5

*Duplicate test.

COMMERCIAL FERTILIZERS FOR WHEAT

During the past four years this Station has carried on a considerable amount of experimental work with commercial fertilizers. Both plot and field areas have been used and general supervision has been given to co-operative trials of fertilizer on farms in the district surrounding this Station.

In general, the object of the experiments has been to determine the influence of different commercial fertilizers alone and in combination on the yield, quality and earliness of wheat.

The method at first used was to lay down a plot experiment in which the various fertilizers and mixtures were applied to the soil by hand broadcasting and worked into the soil just prior to seeding. In 1928 a combination fertilizer and seed drill was purchased. Since that time all fertilizers have been applied with the drill excepting where the experiment called for some other method for the purpose of comparison. In the plot experiments wheat is grown in a three-year rotation of fallow, wheat, wheat. All plots are duplicated and untreated check plots are equal in number to the treated plots. The fertilizers used are ammonium sulphate (to supply nitrogen), triple superphosphate (to supply phosphorus), muriate of potash (to supply potash). Ammonium phosphate was used in some cases where a combination fertilizer was required.

On the field areas on the Station and on farms in the district triple superphosphate was the chief fertilizer under trial. Rates of application varying from 40 lbs. to 120 lbs. per acre have been tried for wheat on both fallow and stubble land. The field trials were conducted on soils varying from light sand to heavy clay. In 1930 an intensive study, by the rod-row method, was undertaken to get some further information on methods of application, depth and position of fertilizers in relation to the seed. A number of difficulties were encountered which spoiled the results of some parts of the experiments. However, such data as we have obtained are included in the following tables together with summaries of all yield data obtained on plots and fields during the past three years.

All of the ammonium phosphate, triple superphosphate and part of the other fertilizers used in the tests were supplied by the Consolidated Mining & Smelting Co., Trail, B.C.

TRIALS OF TRIPLE SUPERPHOSPHATE FOR WHEAT

On the farm of L. A. Sackett, Swift Current

Rate of application	Soil treatment	Yield per acre			
		1928	1929	1930 1st test	1930 2nd test
		bush.	bush.	bush.	bush.
120 pounds per acre	Fallow	32·4	16·73	.....	.....
60 pounds per acre	Fallow	29·4	15·02	22·20	20·02
Check—no fertilizer	Fallow	21·0	7·75	18·36	19·0

TRIALS OF TRIPLE SUPERPHOSPHATE FOR WHEAT

On different farms of representative soil types in the Swift Current district

Rate of application	Soil treatment	J. T. Stewart, Stewart Valley, 1929	John Kruse, Swift Current, 1929	C. M. Moffat, Swift Current, 1930	Wash-ington Farm, Swift Current, 1930	Exp. Station, Swift Current, 1930
		bush.	bush.	bush.	bush.	bush.
120 pounds per acre	Fallow	28·00	7·40	11·60	.....	.....
60 pounds per acre	Fallow	28·40	8·60	.....	.....	.....
50 pounds per acre	Fallow	.....	.....	15·51	8·80	22·79
Check—no fertilizer	Fallow	21·1	10·3	11·69	8·70	19·86
120 pounds per acre	Stubble	.....	3·30	.....	.....	.....
60 pounds per acre	Stubble	.....	2·40	.....	.....	.....
50 pounds per acre	Stubble	.....	.....	.....	5·10	10·66
Check—no fertilizer	Stubble	.....	4·80	.....	6·36	12·00

COMMERCIAL FERTILIZERS FOR WHEAT

Applied with combination fertilizer and seed drill

Kind of fertilizer and rate of application per acre	Yield per acre			
	1930		Average two years	
	Wheat on fallow	Wheat on stubble	Wheat on fallow	Wheat on stubble
	bush.	bush.	bush.	bush.
Superphosphate applied on fallow only—				
No fertilizer (check)	17·9	.....	16·1	.....
50 pounds per acre	16·7	.....	15·8	.....
100 pounds per acre	26·0	.....	20·7	.....
No fertilizer (check)	21·5	.....	18·3	.....
Superphosphate applied on stubble only—				
No fertilizer (check)	.....	5·9	.....	5·7
50 pounds per acre	.....	14·0	.....	8·8
100 pounds per acre	.....	7·9	.....	5·6
No fertilizer (check)	.....	8·6	.....	6·6
Superphosphate applied on both fallow and stubble—				
No fertilizer (check)	17·1	6·9	16·0	6·7
50 pounds per acre	23·8	12·3	19·5	11·7
100 pounds per acre	18·8	8·2	17·7	10·8
No fertilizer (check)	22·3	11·5	18·9	12·8
Ammonium sulphate applied on fallow—				
No fertilizer (check)	17·6	.....	16·0	.....
50 pounds per acre	15·5	.....	15·3	.....
100 pounds per acre	15·1	.....	14·5	.....
No fertilizer (check)	16·0	.....	15·1	.....

COMMERCIAL FERTILIZERS FOR WHEAT—*Concluded*

Applied with combination fertilizer and seed drill—*Concluded*

Kind of fertilizer and rate of application per acre	Yield per acre			
	1930		Average two years	
	Wheat on fallow.	Wheat on stubble.	Wheat on fallow.	Wheat on stubble
	bush.	bush.	bush.	bush.
Ammonium sulphate applied on stubble—				
No fertilizer (check)	.....	7·4	.....	5·5
50 pounds per acre	.....	7·2	.....	5·5
100 pounds per acre	.....	6·8	.....	5·8
No fertilizer (check)	.....	8·6	.....	6·6
Ammonium sulphate applied on both fallow and stubble—				
No fertilizer (check)	18·4	8·2	15·1	6·6
50 pounds per acre	17·5	8·7	15·7	7·3
100 pounds per acre	16·1	7·5	14·5	6·8
No fertilizer (check)	17·5	7·8	16·9	6·8
Muriate of potash applied on fallow—				
No fertilizer (check)	20·1	.....	18·3	.....
25 pounds per acre	20·7	.....	18·9	.....
50 pounds per acre	18·1	.....	17·3	.....
No fertilizer (check)	19·5	.....	17·8	.....
Muriate of potash applied on stubble—				
No fertilizer (check)	.....	13·2	.....	8·3
25 pounds per acre	.....	17·9	.....	11·6
50 pounds per acre	.....	13·8	.....	8·2
No fertilizer (check)	.....	13·1	.....	7·7
Muriate of potash applied on both fallow and stubble—				
No fertilizer (check	26·7	12·3	20·8	7·7
25 pounds per acre	23·3	10·9	19·4	7·8
50 pounds per acre	25·0	7·2	20·3	5·9
No fertilizer (check)	24·3	8·1	19·6	5·8
Combined fertilizer applied on fallow—				
No fertilizer (check)	15·2	.....	15·5	.....
50 pounds phosphate; 50 pounds amm. sulphate, 25 pounds potash	18·7	.....	16·7	.....
100 pounds phosphate; 100 pounds amm. sulphate; 50 pounds potash	17·2	.....	15·2	.....
No fertilizer (check)	13·5	.....	13·6	.....
Combined fertilizer applied on stubble—				
No fertilizer (check)	.....	12·7	.....	8·3
50 pounds phosphate; 50 pounds amm. sulphate; 25 pounds potash	.....	14·1	.....	9·1
100 pounds phosphate; 100 pounds amm. sulphate; 50 pounds potash	.....	13·7	.....	7·9
No fertilizer (check)	.....	13·5	.....	8·2
Combined fertilizers applied on both fallow and stubble—				
No fertilizer (check)	17·0	9·7	14·8	7·0
50 pounds phosphate; 50 pounds amm. sulphate; 25 pounds potash	23·3	12·2	18·1	10·4
100 pounds phosphate; 100 pounds amm. sulphate; 50 pounds potash	19·5	7·1	17·1	6·8
No fertilizer (check)	23·2	10·1	18·3	8·8

COMMERCIAL FERTILIZERS—DRILLING VERSUS BROADCASTING

1/50-acre plots duplicated—Sown on fallow

Kind of fertilizer, rate and method of application	Yield grain 1930	
	Yield per acre	Weight per bushel
	bush.	lb.
Superphosphate—		
No fertilizer (check)	18·5	60·25
25 pounds per acre, drilled	19·2	59·5
50 pounds per acre, drilled	22·1	59·75
No fertilizer (check)	18·8	59·75
Superphosphate—		
No fertilizer (check)	18·8	59·75
100 pounds per acre drilled	20·7	60·0
100 pounds per acre broadcast	17·4	60·0
No fertilizer (check)	21·1	60·25
Ammonium phosphate—		
No fertilizer (check)	21·1	60·25
100 pounds drilled	20·0	59·0
100 pounds broadcast	17·3	58·75
No fertilizer (check)	17·5	59·5

METHOD OF APPLICATION OF FERTILIZERS TO WHEAT GROWN ON FALLOW

Average Yields of four Rod-Row Plots

Plot No.	Method	Yields per acre, 1930	
		On station	On Washington farm
		bush.	bush.
1	Check (no fertilizer)	19·67	23·72
2	100 pounds superphosphate—broadcast	19·51	22·44
3	100 pounds superphosphate—contact with seed	15·07*	11·69†
4	Check (no fertilizer)	21·28	25·88
5	100 pounds superphosphate—above seed	20·89‡	21·72
6	100 pounds superphosphate—below seed	22·33	22·27‡
7	Check (no fertilizer)	22·28‡	26·55
8	100 pounds superphosphate—level but two inches at side	18·73	22·17
9	100 pounds superphosphate-contact-mixed with soil	18·90	18·90
10	Check (no fertilizer)	18·79	27·49
11	100 pounds superphosphate "V" shaped trench	17·79	19·34
12	100 pounds superphosphate—drill ahead of seed	19·95	24·61
13	Check (no fertilizer)	19·34	26·49
14	100 pounds nitrate of soda—broadcast	19·67	26·16
15	100 pounds nitrate of soda—contact with seed	15·07	27·82
16	Check (no fertilizer)	19·17	29·76
17	100 pounds muriate of potash—broadcast	16·51	26·71
18	100 pounds muriate of potash—in contact with seed	17·35	27·49
19	Check (no fertilizer)	20·06	27·54

*One plot.

†Average of two plots.

‡Average of three plots.

An examination of yields obtained in the fertilizer experiments will at once reveal wide differences in the apparent effect of the same fertilizer on the yield of wheat in different years and different places. If any conclusions are to be drawn from this work careful consideration must be given to observations made during the growing seasons.

GERMINATION

When fertilizers have been applied broadcast or with the combination fertilizer and seed drill, no case of impaired germination has been observed excepting in one instance in which the fertilizer was applied at an excessive rate due to a wrong setting of the drill. Neither has it ever been observed in these tests that any of the fertilizers used had any effect in stimulating germination.

STOOLING AND EARLY GROWTH

In practically every trial, it has been observed that stooling has been increased and midseason growth has been markedly stimulated by the phosphate fertilizers when these were drilled in with the seed. The nitrogen fertilizers have had little or no effect on the crop in the same period. Potash fertilizer has shown no apparent effect on the crops at any time in the season, nor in any of the conditions under which it was applied.

EFFECTS ON CROP DAMAGE

In a number of the experiments, it was evident that the stimulating effect of phosphates on stooling and subsequent growth of the wheat crop was sufficient to enable the crop to at least partly overcome the effects of wire worm damage. It seems clear that on the farm of Mr. Sackett, particularly in the years 1928 and 1929, the chief advantage of the fertilizer lay in the fact that it gave the crop sufficient stimulus to enable it to make nearly a normal stand in spite of heavy wire worm damage early in the season. In 1930 on the same farm, wire worm damage was much less on all plots than in the two preceding years. Although the superphosphate made a striking improvement in the appearance of the crop this year, yield differences were much smaller than in either of the two preceding years. This would appear to be due to the fact that on the check plots of 1930 there was approximately a normal stand, while in the earlier years, the stand was thin due to wire worm damage in the early part of the season.

EFFECT OF FERTILIZER ON WEED GROWTH

On several farms fertilizer trials were conducted on land which was infested with wild oats and other weeds. Where this condition prevailed, the stimulation of the crop by the superphosphate enabled the crop to compete much more effectively with the weeds. This was true only where the fertilizer was drilled in with the seed. Nitrogen and potash fertilizers seemed to have no effect on the relative success of weeds and wheat.

MATURITY OF CROP

As indicated under other headings nitrogen and potash, alone or combined, had no effect in advancing maturity. In every trial which included superphosphate either alone or combined with other fertilizer, the maturity of the crop was advanced by from five to ten days. The stimulation of growth and advancement of maturity were the most obvious and striking effects of the superphosphates.

EFFECTS ON YIELDS

A study of the tables shows no consistent differences between fertilized and unfertilized plots in the matter of yields. With nitrogen and potash again, it cannot be said that any increased yields have been obtained at any time. Where superphosphate was used there were instances of marked improvement in yield. Other instances of apparent decreases, and others in which no differ-

ences were recorded. For the purpose of reaching a tentative conclusion as to where superphosphate may be expected to increase the yield of grain it is important to consider the conditions of soil and rainfall under which some of the tests were conducted.

On the Sackett farm in 1928 and 1929, the fallow supplied fair amounts of moisture and the worms did damage from which the unfertilized crops did not recover. There was in short more moisture available than could be used by the thin stand of wheat on check plots and sufficient moisture to supply the needs of the much heavier stand resulting from the application of fertilizer. In both years there were remarkable differences in yield in favour of fertilizer crops. On the Stewart farm in 1928 the moisture supply in the fallow was fairly good. The soil was a heavy clay which held moisture well. The result was an increased yield of 8 bushels per acre from fertilized land. In the same year the superphosphate showed no beneficial effect when applied on the sandy soil on the farm of John Kruse.

In 1930 with a shortage of moisture the dominant factor in yields on all fields on which fertilizer tests were carried out, differences in yield, between treated and untreated areas, were small. During June and early July fertilized fields presented a remarkably fine appearance as compared with checks, but the drought of July reduced them all to a common condition of low yield.

In all tests in which the superphosphate had a material effect in improving yields, the moisture conditions were fair to good, the soil was medium to heavy or there was some crop damage such as that done by wire worms.

On sandy soils and stubble land, both usually deficient in moisture, the effect of the fertilizer on yield was small or even adverse.

THE EFFECT OF FERTILIZER ON QUALITY OF WHEAT

In most tests there has been no apparent difference in quality of grain between fertilized and unfertilized fields. In a few fields, where the superphosphate stimulated a heavy growth of crop which could not be supported by the available moisture, there was a tendency for the fertilizer to slightly increase shrivelling of grain. Strength of straw did not seem to be materially influenced in any of our tests.

METHODS OF APPLYING FERTILIZER

From all available information it seems clear that if any benefit is to be derived from superphosphate it must be drilled into the soil, preferably with the seed. Broadcasting on top and working into the soil has been of no value.

RATES OF APPLICATION

Rates of application varying from 40 to 120 pounds per acre of triple superphosphate have been tried. Even where the effect was most marked there was little advantage in using more than 60 pounds per acre. In several tests, especially under dry conditions, rates of application above 100 pounds per acre proved less valuable than 40 to 60-pound applications.

DRILLS

With drills and fertilizer used in the tests difficulty was experienced in getting any predetermined rate per acre actually applied. The humidity of the air influenced the drillability of the fertilizer to such an extent that uniform rates could not be maintained. With a fertilizer of more uniform and granular consistency, this difficulty could probably be largely overcome. On some drills improvement of the feed drive mechanism is required. With any drill the operator must be careful to clean the fertilizer out of the box if the drill is to be left standing for any length of time, especially in damp weather.

SUMMER-FALLOW SUBSTITUTES

The summer-fallow substitute project has been carried on now for a period of nine years. The method is to grow the substitutes as shown in the above table and in the following year all plots are seeded uniformly to wheat. In the 1929 report this project was fully reported and conclusions reached which need not be repeated here, excepting to point out that the tendency then noted for the land occupied by this project to become weedy has so increased that the 1930 wheat crops had to be ploughed under in June. Hence, there are no yields of wheat following substitutes to be published this year. The impossibility of keeping weeds under control in the rows without hand hoeing is one of the most serious objections to the whole idea of fallow substitutes. Moreover, as previously reported, when the yield of wheat in rows is added to the yield of the succeeding wheat crop, the total is very little greater than the yield of a single crop on fallow.

RESULTS FROM VARIOUS SUMMER-FALLOW SUBSTITUTES

1/50-acre plots triplicated

	Fallow substitute	Yield per acre					
		1930			Nine-year average		
		Grain or potatoes	Fodder, green weight	Fodder, dry weight	Grain or potatoes	Fodder, green weight	Fodder, dry weight
		bush.	tons	tons	bush.	tons	tons
1	Potatoes—rows 42 inches by 18 inches	45·1	.....	.....	121·6	.....	.....
2	Millet—double rows	.....	1·22	0·29	.....	.....	.....
3	Sunflowers—hills 42 inches by 42 inches	.....	2·13	0·50	.....	9·32	1·69
4	Corn—hills 42 inches by 42 inches	.....	4·44	1·12	.....	5·75	1·10
5	Oats—triple rows	23·0	.....	.....	40·1	.....	.....
6	Oats—double rows	16·2	.....	.....	34·1	.....	.....
7	Oats—sown one-half bushel per acre	9·7	.....	.....	33·5	.....	.....
8	Wheat—double rows	3·3	.....	.....	8·3	.....	.....
9	Oats—sown 2 bushels per acre June 26 for green feed	.....	Failed	Failed	.....	3·20	1·71
10	Barley—double rows	7·5	.....	.....	19·8	.....	.....

SEQUENCE OF CROPS

The crop sequence experiment was laid down seven years ago for the purpose of securing information on the effect of various crops on the yields of succeeding crops. The crops originally used were wheat, oats, corn, annual sweet clover and millet. The experiment is so arranged that each crop is grown after each other crop as well as after itself and on fallow. As the experiment progressed, it was found that the annual sweet clover and corn could not be depended upon to make normal stands every year. When one of these crops failed the land was practically a summer-fallow which resulted in a higher yield of the succeeding crop than would have been the case, had there been no failure. To overcome this difficulty, early in the experiment, peas replaced the sweet clover and beginning with the 1930 crop potatoes replaced corn. In other experiments there have never been failures of peas or potatoes. Hence it is expected that the peas will consistently provide a leguminous crop and the potatoes a crop which may be fairly regarded as the best available summer-fallow substitute. In comparing yields of any one crop on fallow, with yields after crops, the fact that corn particularly has often failed to make a full stand must be kept in mind. The yields of most of the crops after corn are probably too high for the reason explained above. It has also been observed that the

millet has not always produced as good crops as the moisture supply of the season would warrant. The reason for this has usually been that the millet made a very slow growth in the early part of the season when temperatures were comparatively low and moisture conditions reasonably good. During the same period such crops as oats, peas and wheat would make excellent progress. During such seasons the millet might never make a strong growth with the result that all available moisture would not be used, thereby leaving a reserve for the next crop. On the contrary when a good stand and a vigorous growth of any crop was obtained, the available moisture would be completely used leaving no carry-over in the subsoil.

With wheat and oats there is no doubt of the marked superiority of the yields on fallow. The yields following corn are good but the poor yields of corn partly explain the good yields of wheat and oats. Peas are also materially influenced by the available moisture in the fallow. Corn on the other hand seems to do as well after other crops as on fallow. In fact the best stands and yields of corn have been on land which grew corn in the preceding year.

RESULTS OF SEQUENCE OF CROPS EXPERIMENT

Preceding crop	1930 crop	Yield per acre 1930	Average yield per acre for seven years
		Grain	Grain
		bush.	bush.
Wheat	Wheat	6·1	15·1
Fallow	Wheat	23·5	26·4
Millet	Wheat	20·0	19·7
Corn	Wheat	22·2	24·8
Peas	Wheat	12·1	16·0
Oats	Wheat	7·5	12·6
Wheat	Oats	20·0	30·8
Fallow	Oats	46·9	55·3
Millet	Oats	41·9	35·3
Corn	Oats	51·8	52·1
Peas	Oats	19·1	33·5
Oats	Oats	23·2	28·9
		*Cured fodder tons	*Cured fodder tons
Wheat	Millet	0·34	1·28
Fallow	Millet	0·77	1·71
Millet	Millet	0·57	0·91
Corn	Millet	1·23	1·89
Peas	Millet	0·80	1·33
Oats	Millet	0·73	1·36
Wheat	Peas	0·73	†0·99
Fallow	Peas	1·77	†1·75
Millet	Peas	1·81	†1·78
Corn	Peas	1·93	†2·06
Peas	Peas	1·31	†1·73
Oats	Peas	1·09	†1·24
		Green weight tons	Green weight tons
Wheat	Corn	3·27	1·70
Fallow	Corn	3·03	1·84
Millet	Corn	3·60	1·68
Corn	Corn	3·69	1·44
Peas	Corn	4·21	1·76
Oats	Corn	3·00	1·59

*Cured weight based on uniform moisture content of 12 per cent.
†Four-year average.

DIFFERENT DATES OF PLANTING CORN AND SUNFLOWERS

In this experiment the rotation followed is a simple alternation of corn or sunflowers with wheat. Therefore all yields of corn and sunflowers are obtained on ploughed wheat stubble land.

It will be observed that with neither variety of corn is the highest yield obtained from the earliest planting. Moderately early planting, however, has proven better than very late planting.

Early planting of sunflowers has always produced the highest yields.

RESULTS FROM DIFFERENT DATES OF PLANTING CORN AND SUNFLOWERS

—	Date first plants emerged	Yield per acre			
		1930		Seven-year average	
		Green weight	Dry weight	Green weight	Dry weight
		tons	tons	tons	tons
Northwestern Dent—					
May 1	May 26	1·99	0·64	5·20	1·02
" 10	May 30	2·84	0·80	6·34	1·32
" 20	June 6	2·11	0·60	5·95	1·23
" 30	June 16	2·88	0·77	5·77	1·03
June 9	June 23	2·50	0·58	5·83	0·85
Improved Squaw—				Three-year average	
May 1	May 26	1·67	0·65	2·63	0·62
" 10	May 30	2·05	0·86	4·10	0·67
" 20	June 6	2·39	1·17	2·80	0·77
" 30	June 16	2·77	0·98	3·03	0·74
June 9	June 23	2·74	0·82	2·55	0·58
Russian Giant Sunflowers—				Eight-year average	
May 1	May 16	7·27	1·70	11·68	2·27
" 20	June 13	3·33	0·86	9·73	1·82
June 9	June 23	1·99	0·43	5·79	1·69

FODDER CORN AND SUNFLOWERS IN HILLS AND ROWS

After six years of trial it is apparent that there is no important difference in yield of corn as between planting in hills and planting in rows. Other conditions such as wire worm damage to seed, frost and moisture supply are much more important. If a check row planter is used, the hand labour involved in weed control is somewhat reduced. Usually however, the acreage of corn grown is so small that the purchase of special machinery is not justified. Hence the seed drill may be used quite satisfactorily for planting corn. It is only necessary to stop sufficient seed runs to give the spacing desired between the rows.

It is always better practice to seed sunflowers in rows. Spacing of sunflower plants at from four to six inches apart in the row produces near the maximum yield with normal moisture conditions. Moreover the plants are of such a size that the crop can be more easily handled at harvest time than is the case with a more thinly planted crop.

YIELDS OF FODDER CORN AND SUNFLOWERS IN HILLS AND ROWS

Variety	Method	Spacing of plants	1930 yield		Six-year average	
			Green weight	Dry weight	Green weight	Dry weight
		rows, inches	tons	tons	tons	tons
Fodder corn—						
Gehu	Rows 42 inches apart	6	3·74	1·35	6·86	1·52
		12	4·14	1·29	6·69	1·33
		18	3·76	1·14	6·36	1·21
		Hills, plants				
	Hills, 42 inches by 42 inches	2	3·45	1·28	5·30	1·26
		4	3·81	1·40	6·32	1·42
		Rows, inches			Seven-year average	
Sunflowers—						
Russian Giant	Rows 42 inches apart	6	3·80	0·95	8·52	1·93
		12	3·33	0·86	7·74	1·62
		18	3·60	0·86	6·77	1·46

METHODS AND DATES OF PLANTING CORN

The 1930 season, although too dry for the most satisfactory growth of all crops under trial favoured the ripening of the corn crop. The following tables show fairly substantial yields of ripe corn from several methods and dates of planting. The Burleigh County mixed which is a small flint corn planted in hills during the latter part of May produced the highest yields of ripe corn.

DATES OF PLANTING CORN—YIELDS OF RIPE CORN COBS PLANTED IN HILLS

Date planted	Date first plants emerged	Yield per acre
		lb.
Burleigh County Mixed		
May 1	May 26	800
May 10	May 30	1,260
May 20	June 6	1,060
May 30	June 16	1,500
June 9	June 23	400

CORN PLANTED IN HILLS AND ROWS—YIELDS OF RIPE CORN PLANTED MAY 2

Variety	Method	Spacing of plants per hill	Yield of ripe cobs per acre
		in.	lb.
Gehu	Rows 42 inches apart	6	930
		12	730
		18	800
		plants	
	Hill 42 inches by 42 inches	2	625
		4	1,040

PREPARATION OF LAND FOR GRASSES AND LEGUMES

It seems very difficult in this experiment to definitely relate the method of soil preparation to the stand or yield of grasses, alfalfa and sweet clover. All methods failed to produce satisfactory stands from the 1929 seeding. The result was that the thin, weed infested crops of 1930 were ploughed under in

late May and the land reseeded to oats. In other years all methods followed in this experiment have produced good stands as indicated earlier in this report. Depth of seeding often has an important bearing on success in getting stands of these crops but it often happens that what appear to be the best methods fail under adverse weather conditions.

PREPARATION OF LAND FOR GRASSES AND LEGUMES
1/100-acre plots triplicated—Seeded June 20

Plot treatment	Yield per acre 12 per cent moisture content basis			
	1930		Average for three years	
	Brome, western rye, alfalfa	Arctic white sweet clover	Brome, western rye, alfalfa	Arctic white sweet clover
			tons	tons
Fall ploughed, spring harrowed, cultivated, until seeding, harrowed	Thin and weedy	Thin and weedy	0·53	0·85
Fall ploughed, spring harrowed, cultivated until seeding, harrowed, packed, seeded, packed	Thin and weedy	Thin and weedy	0·47	0·91
Spring ploughed early, harrowed, cultivated until seeding, harrowed, seeded	Thin and weedy	Thin and weedy	0·47	0·97
Spring ploughed early, harrowed, cultivated until seeding, harrowed, packed, seeded, packed	Thin and weedy	Thin and weedy	0·45	0·84
Ploughed about June 1, harrowed, seeded, harrowed	Thin and weedy	Thin and weedy	0·44	0·94

DATES OF SEEDING HAY MIXTURE AND WHITE SWEET CLOVER

In the six years covered by this experiment the late fall seedings of grasses and clovers have consistently failed to produce stands. In some years, the early spring seedings have completely failed and in others the stand has been thin and overrun with weeds. June seedings have as a rule produced good stands and have been comparatively free from weeds. Yields have followed very much in proportion to stands obtained. This method involves spring ploughing and other work to keep down weeds until seeding time as well as loss of crop for the year of seeding and is, therefore, expensive. It is, however, the best method to follow when the certainty of getting a stand is very important.

RESULTS FROM DIFFERENT DATES OF SEEDING HAY CROP MIXTURE AND WHITE SWEET CLOVER SOWN WITHOUT NURSE CROP ON PLOUGHED WHEAT STUBBLE

Crop	Date seeded 1929	Yield of cured hay 12 per cent moisture content	
		Yield 1930	Average yield for 6 years
		tons	tons
Brome grass, western rye grass, alfalfa	May 1	Failed	0·73
	May 15	Failed	0·66
	May 30	0·60*	0·80
	June 15	0·59*	1·12
	July 1	Failed	1·37
	Oct. 1	Failed	.....
	Oct. 15	Failed	.....
White sweet clover	May 1	Failed	1·09
	May 15	Failed	0·97
	May 30	0·89*	1·47
	June 15	0·93*	1·50
	July 1	1·12*	1·44
	Oct. 1	Failed	.....
	Oct. 15	Failed	

*In duplicate test.

RATES AND DATES OF SEEDING FALL RYE ON FALLOW

In six years out of the seven covered by this experiment the highest yields of fall rye on fallow have been obtained from the September 1 seedings. In the other year August 15 seedings were best. When seeding is done as late as September 30 a considerable decline in yield is noted. Likewise July seedings are much less productive. The range of dates of seeding for maximum yields extends from about August 15 to September 10, the earlier part of that period being slightly better than the later part.

Differences in yield due to different rates are neither important nor consistent. Any rate approximating three pecks or a bushel produces all the stand that can be supported by the available moisture supply.

RESULTS FROM DIFFERENT RATES AND DATES OF SEEDING FALL RYE ON FALLOW
1/50-ACRE PLOTS TRIPLICATED

—	Rate bushels per acre	Date sown	Date of ripening	Height at harvest	Yield of grain per acre, 1930	Average 7 years
				in.	bush.	bush.
1	¾	July 15	July 21	20	8·1	18·7
2	1	" 15	" 21	20	5·8	17·4
3	1¼	" 15	" 21	20	5·5	14·8
4	1½	" 15	" 21	20	7·1	18·9
5	1	Aug. 1	" 21	21	9·1	23·7
6	¾	" 15	" 21	23	12·3	24·9
7	1	" 15	" 21	23	14·0	27·0
8	1¼	" 15	" 21	24	14·2	27·0
9	1½	" 15	" 21	23	11·3	27·0
10	¾	Sept. 1	" 21	26	16·2	28·0
11	1	" 1	" 21	22	15·1	28·6
12	1¼	" 1	" 21	21	15·8	27·2
13	1½	" 1	" 21	23	16·2	28·5
14	1	" 15	" 21	24	15·2	24·7
15	1	Oct. 1	" 21	28	13·5	21·2

PLACE IN ROTATION TO SEED FALL RYE

It is evident from the results of this experiment that rye, like all other crops grown in this area, responds to the good moisture supply available in fallow land. Yields of rye following any crop are much below those obtained on fallow. The lowest yields have resulted from seeding rye with oats in the spring. In this case the rye crop had to contend with the two adverse factors of abnormally early seeding and competition with the oat crop for moisture. Rye following rye in a continuous cropping system has produced low yields due to lack of moisture and excessive stands of volunteer rye.

PLACE IN ROTATION TO SEED FALL RYE 1/50-ACRE PLOTS TRIPLICATED

—	Preceding crop or treatment	Yield per acre	
		1930	Average 7 years
		bush.	bush.
1	Seed on fallow	9·0	26·4
2	Seed on ploughed barley stubble	3·8	14 8
3	Seed on ploughed sod	Failed	14·1
4	Seed on wheat stubble	4·2	14·5
5	Seed on fallow	10·0	26·2
6	Seed with oats	4·1	10·4
7	Seed on disked sunflower stubble	3·5	12·1
8	Seed rye after rye	Failed	11·1
9	Seed on fallow	8·8	25·7
10	Seed on disked corn stubble	7·6	17·6
11	Seed one month after oats sown	2·7	13·5
12	Seed between rows of corn	Failed	17·6
13	Seed between rows of sunflowers	Failed	15·2

FARM MACHINERY TRIALS AND OBSERVATIONS

SEEDING METHODS AND SEED DRILLS

Comparisons of seeding methods and seed drills similar to those conducted in 1929 were again carried out this year. The comparisons included the following: double disk drill, double disk drill with packer attachment, Mitchell subseeder, Kirchner seeder plough, fertilizer drill, standard press drill, hoe drill. The same general methods used in 1929 were again followed in 1930. Observations on the apparent quality of the work done by each machine were made at seeding time. The earliness and uniformity of germination were noted in each case.

It was noted that the low press drill and the standard double disk drill with press attachment showed slightly more even emergence of seedlings, but within a short time the work of those drills could not be distinguished from that of the double disk without the press attachment. The seeding of the single disk drill was not materially different from the others in evenness of emergence and stand.

The hoe drill showed less uniformity in these points than the disk drills. The Mitchell subseeder and the Kirchner both produced somewhat uneven stands due apparently to the uneven depth of seeding.

The following table shows the yields obtained from the different methods of seeding in 1930:

SEED DRILL EXPERIMENT, 1930

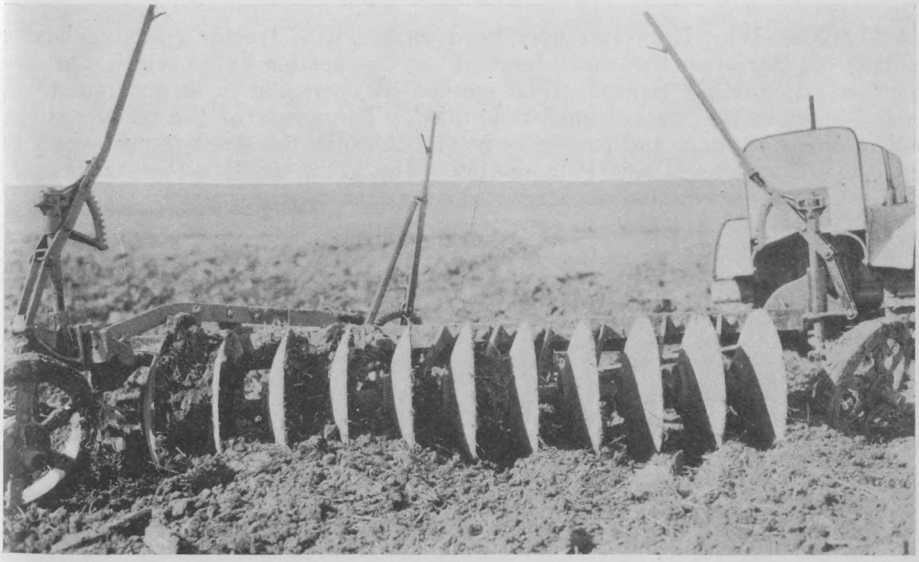
Kind of seeders and attachments	Experimental Station, yield per acre		Washington Farm, yield per acre	
	Fallow	Stubble	Fallow	Stubble
	bush.	bush.	bush.	bush.
Single disk drill	16·91	7·33	10·83	6·93
Double disk drill with press attachment	19·12	10·00	8·00	6·10
Low press drill	18·38	9·33	9·36	5·50
Fertilizer drill—7-inch drills 50 pounds triple superphosphate	22·79	10·66	8·80	5·10
Double disk drill	19·86	12·00	8·70	6·36
Mitchell subseeder	16·91	10·00	6·86	5·66
Hoe drill	16·91	9·33	8·90	6·10
Kirchner seeder plough	12·50	8·00	8·70	5·30

While too much importance cannot be attached to these figures they strongly indicate that standard methods of seeding are at least as good as some of the combinations introduced in recent years. Observations during the season often give a better idea of the relative merits of the different seeding methods than do yield data. Moreover, observations will frequently explain yield variations. In the above table it will be observed that on the Station the Kirchner seeder plough is distinctly low while in the Washington farm test the Kirchner method ranks with the standard drills. This is largely explained by the fact that the tests on the Washington farm were seeded just before a rain and on the Station just after a rain. The fallow land on the Station was then moist enough to stick to the small mouldboard, thus making a very uneven job of covering the seed. On the stubble land no serious trouble was experienced in getting the mouldboard to scour.

In these seed drill trials extending over several years, it has been pretty well demonstrated that seeding methods may differ considerably in detail without materially affecting yields, if weeds are killed before, or at seeding time and

the seed is placed at a uniform depth of not more than three or four inches. It is important, too, that the soil below the seed shall not be loosened in any preparatory work that is done.

One way disk—cleaning perfectly in dry surface soil.



One way disk—plugging up in wet soil.

ONE WAY DISK

The One Way Disk has again given very satisfactory results both in the preparation of stubble land for crop and as substitute for the plough in summerfallow. The cost of operating the One Way Disk is less than half the cost of ploughing. Under many conditions equally good weed control has been obtained

with the One Way Disk as with the plough. A wet surface soil practically prevents the use of the One Way Disk which is a disadvantage compared with the plough. Stubble is left on the surface sometimes to the extent of interfering with the subsequent use of the cultivator. On the other hand the stubble is usually helpful in preventing soil drifting.

TRACTOR TESTING

Early in the summer of 1930 a tractor testing project was undertaken with a view to getting information with respect to fuel economy, slippage and drawbar capacity of both wheel and track type tractors under a variety of soil, grade and traction conditions. So much work is involved in a project of this kind that it was impossible to complete tests this year. However, a substantial start was made, methods proven, and plans made whereby the work should be well advanced during the summer of 1931. While the present data are incomplete and therefore cannot be published, it will be of interest to tractor owners to know that the importance of the ratio of load to actual drawbar capacity is strongly emphasized by the figures obtained. Since a considerable part of the fuel is used to propel the tractor itself, economical operation demands that the load pulled shall be near the maximum capacity of the tractor for the particular conditions under which it is being operated. A margin of safety is, of course, essential to continuous operation. Just what margins are necessary under different conditions are matters that, it is expected, our tests will indicate.

HARVESTING EXPERIMENTS

NEW WAY HARVESTER

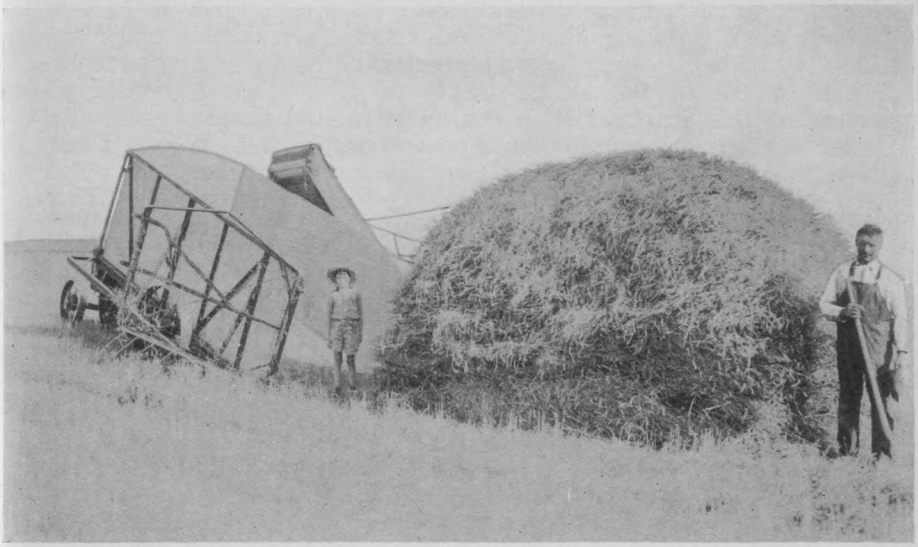
The New Way Harvester may be described as a tractor operated header-stacker. It performs the same function as the header barge which has been described in previous reports. The method of operation is to accumulate the headed grain in the stacker until it is filled. The power of the tractor is then used to operate a rack and pinion by means of which the stack is pushed off the platform while the machine is in motion. The grain cures in the stacks and a buck rake is used to move the stacks to a separator for threshing.

The machine used on the Station was not left long enough to permit of an adequate test being made. Some mechanical troubles developed but not more than might be expected with any new machine of the same general type of construction. In addition to possible mechanical troubles and the availability of repair service the important consideration is whether this method of harvesting is lower in cost or more efficient in grain saving than other available methods.

Several years experience with the home made header barge method clearly indicates that for harvesting thin, uneven or drought stricken wheat crops the header barge method saves more of the grain than any other method tried. In normal crops, differences in grain saving by different methods of harvesting are small.

Assuming the same percentage charge for interest, depreciation and repairs and the same capacity in acres for the same width of cut as for combines, the cost of heading and stacking with a New Way Harvester would be about $1.50 per acre as compared with $1.80 to $2 per acre for straight combining or $2.50 to $2.70 per acre for swathing and combining. If, to the harvesting cost of $1.50 per acre with the New Way Harvester is added a rate of six to eight cents per bushel for moving the stacks and threshing, it will be possible to estimate costs in cents per bushel. With a five-bushel crop the cost of harvesting with combine and New Way Harvester would be about the same. As yields increase the

cost is increasingly in favour of the combine. Under conditions which prohibit the use of the combine or combine and swather the New Way Harvester may find a useful place, but in doing so it must meet the competition of home made



Header-barge and stack.

New-way harvester and stack.

barges and old binders adapted to use as headers. In seasons of short crops these are useful expedients because a small crop can be saved with a small cash outlay. The conditions which demand the use of such expedients do not permit of any great cash outlay for purchase or operation of equipment.

In districts in which combining subjects a crop to considerable weather hazards, particularly that of snow storms, the header stacker method will likely be useful, both in saving grain and reducing cost. But here again it is possible for many farmers to reconstruct binders and build home made barges which will serve the purpose at small cost. At present such districts use the binder and stook threshing almost exclusively. Careful tests under identical conditions would be necessary before farmers could be safely advised to abandon binders in favour of the header-stacker or New Way Harvester method. Experience on this Station and in Southwestern Saskatchewan generally with the latter methods is confined almost exclusively to light crops. Under this condition it can be said that these methods are satisfactory but experience gained here cannot be safely applied where crops are heavy, late in ripening and subject to all the hazards that accompany late harvesting.

THE SELF PROPELLED COMBINE

Through the courtesy of the Waterloo Manufacturing Company a brief trial of the "Sunshine" self propelled combine was made this year. The time allowed for the trial was so short that no definite record of operating costs could be obtained. Obviously, however, if this type of combine proves to be mechanic-

Self-propelled combine.

ally sound and capable of handling crop conditions that prevail on the prairies, the cost of operation will be materially lower than that of the present day combine which requires two men and two power units.

In our brief test the Sunshine combine was capable of propelling itself over any reasonable grade without impairing threshing efficiency. No repairs of any consequence were required and one capable man found no difficulty in operating the outfit. In many respects the self propelled combine was more easily controlled than the ordinary combine. The only serious difficulty encountered was that the heading mechanism failed to deliver the headed grain to the auger conveyor when any considerable amount of sawfly damage was encountered. Not only did it fail to carry back the sawfly cut stalks, but these collected in the comb and prevented standing grain from reaching the auger.

This difficulty can doubtless be overcome by some changes in construction, in which case this type of combine may find a useful place on farms of moderate size. In this connection it should be borne in mind that the light combine operated by a power take-off from the tractor has never received a fair trial in Western Canada for the reason that such combines of this type, as have been tried, have been attached to tractors of inadequate power. If this defect is corrected, as it can be quite easily, then a one man combine will be available at low cost and the power unit will be detachable for other farm work.

HARVESTING LOSSES

Comparisons of losses with different methods of harvesting which were continued again this year confirm the findings of previous years that losses are influenced to a greater extent by crop conditions and seasonal factors than by methods. The tests were made this year on a crop which was fairly heavily damaged by sawfly. The average yield was about eighteen bushels with losses running from 1·5 to two bushels per acre. With the binder and header, harvesting losses only were determined this year. Losses involved in moving stooks and threshing were not taken because these losses are fairly constant from year to year, while harvesting losses vary greatly with crop conditions. Straight combine and combine and swather losses include both losses sustained through failure to pick up some sawfly cut crop as well as those resulting from the threshing operations. Stated in percentage of the gross yield, losses were as follows: Binder 9·68 per cent; swather and combine 12·67 per cent; header 8 per cent and straight combine 10 per cent. When allowance is made for threshing losses not recorded for binder and header crops the totals would at least equal straight combine losses. The greater part of the loss by all methods this year was due to sawfly damage. It was estimated that with the closest possible cutting with the combine approximately one-half of the sawfly cut grain was picked up. The header picked up a little more of the sawfly cut grain than the combine. Very early in the harvesting season the binder saved the sawfly infested crop before the actual cutting of the stems was done. However, drought hastened both the ripening of the crop and the activity of the sawfly larvæ with the result that much damage was done by the time binders had been at work for a few days.

HILLSIDE ATTACHMENT ON STRAIGHT COMBINE

Up to the present time combines of distinctly different construction have been used for level land and for hilly land. The two types are generally referred to as the "Prairie Type" and the "Hillside Type." So far the Prairie type has been used almost exclusively in Western Canada, but with more than 9,000 combines in use in the three prairie provinces in 1930, many of the machines have been used on land that was far from being level. Some complaints have been heard from farmers on hilly land that the combines were not saving all the grain. This fact has brought up the question as to the grades on which the Prairie type combine may be used without too great a loss of grain and also whether a simple levelling device used on a prairie type combine would result in increased saving of grain when the combine was operated on hilly land.

To secure some information on this point, a Caterpillar Model 34 combine with a 15-foot header and fitted with a levelling device was used. Two different tests were made. In the first case the combine was operated on a hillside where the grade varied from 5 to 25 per cent. On the greater part of this field the grade was around 15 per cent.

Alternate rounds were made with and without the levelling device. When the levelling device was not used the combine operated as a straight prairie type. When it was used the combine separator was kept level laterally whatever the shape of the land might be. Twelve rounds of the field were made with each setting. Yields from individual rounds showed no consistent difference in outturn between the two methods. The gross yield from the 12 rounds in which the levelling device was used was 164·2 bushels, while from the corresponding twelve rounds without the levelling device being used the gross yield was 163·3 bushels. Stated in bushels per acre the difference would be less than one-tenth of a bushel.

It will be seen at once that the use of the levelling device made no difference to the total outturn of grain. Careful observations of the combine while in operation lead to the conclusion that it was threshing and saving the grain satisfactorily in both methods of operation. As indicated in the studies of losses in combining, any important loss that did occur was due to sawfly having cut a percentage of the crop, so that the combine header could not pick it up.

The only conclusion that can be drawn from this experiment is that, with the combine used, there is no necessity for a levelling device on land such as that on which the experiment was conducted. The fact that the field was small (only 25 acres) and that the slopes were such that the combine was not kept tipped in one direction for any great distance suggested the possibility that if the combine was kept on one uniform slope for any considerable distance, that the use of the levelling device might show some improvement in recovery of grain over the straight combine.

It was therefore decided to repeat the experiment on level land on a field one mile in length. For one round the levelling device was used to tip the combine at some definite angle and the angle was maintained for a distance of two miles. When making the alternate round the combine was left in the level position. The data from this test are shown in the following table:—

Grades	Yield per acre bushels
Check-level	14.08
5 per cent grade	15.19
10 per cent grade	15.07
Check-level	15.44
12½ per cent grade	15.56
22 per cent grade	14.08
Check-level	14.82

Again we are forced to the somewhat amazing conclusion that the operation of the combine at even as great a slope as would be given by a 20 per cent grade did not reduce its separating efficiency.

It would, of course, be unsafe to conclude that the same results would be obtained under all conditions, because the writer has observed cases in which combines were evidently wasting grain when operated on side hills. However, no figures were obtainable as to exact losses.

For the time being, judgment on the advisability of using levelling attachments on prairie type combines must be suspended until more comprehensive trials can be conducted.

HORTICULTURE

VEGETABLES

BEAN VARIETIES

Seventeen varieties were planted on May 3. All had germinated fairly well by May 28 and escaped the frost of May 22. Yields of pods, however, were generally light. The highest yielding variety was Wardwell Kidney Wax which produced 11 pounds 6 ounces per 30-foot row. Refugee yielded 10 pounds 4 ounces and Interloper Challenge Black Wax produced 8 pounds per 30-foot row.

BEETS—VARIETY TEST

Six varieties were sown on April 21 and germinated on May 17. All the varieties were damaged by the May frost so that no yields were obtainable.

BEETS—DATES OF SEEDING

Five sowings of the Detroit Dark Red varieties were made, spaced at 10-day intervals in order to determine the best time to sow beets for the production of maximum yield of suitable size and quality of roots for storage purposes. The first two sowings of April 12 and April 22 respectively were damaged by frost. The third sowing produced a 60 per cent stand of good quality roots. Better stands and heavier yields were obtained from the later sowings, but the roots were of inferior quality.

BORECOLE OR KALE—VARIETY TEST

Two varieties, Dwarf Curled and Tall Green were sown in flats in the greenhouse on March 24 and were pricked out during the first week of April. They were transplanted to the open ground on May 26. This vegetable made excellent growth and supplied frequent cuttings of green leaves throughout the season. This vegetable deserves wider use because of adaptability, usefulness and productivity. The Tall Green variety produced 90 pounds per 30-foot row, while the Dwarf Curled produced 50 pounds per 30-foot row. The latter while not the heaviest yielding variety is preferred because of its finer quality.

BRUSSELS SPROUTS—VARIETY TEST

Five varieties were grown, but only two produced reasonably developed sprouts, namely Long Island Improved and Little Gem. The varieties were severely attacked by aphids.

CABBAGE

Seed of twenty two varieties of cabbage was sown in flats in the greenhouse on March 24 and were pricked out during the first week of April. Well developed plants were set out in the open on May 26. The dry period of July retarded the development of the late maturing varieties to the extent that many failed to form heads. The season was more favourable for growing the early varieties. Best early varieties are Golden Acre, Early Jersey Wakefield and Babyhead. Best medium early varieties are Brandon Market and Kildonan.

CABBAGE—RESULTS OF VARIETY TEST

Variety	Average weight per head, 1930	Average for six years
	lb.	lb.
Glory of Enkhuizen	5·81	9·06
Succession	3·68	7·54
Kildonan	4·12	7·28
Brandon Market	5·18	6·78
Danish Ballhead (short stem)	3·81	6·70
Golden Acre	5·25	6·00
Baby Head	2·87	*5·02
Copenhagen Market	3·68	5·38
Improved American Savoy	2·68	4·80
Ex. Amager Danish Ballhead	3·81	4·33
Danish Ballhead	5·00	4·83

*Indicates five-year average.

CABBAGE—RESULTS OF DATES OF SEEDING AT TEN-DAY INTERVALS

Variety	Sowing	Yield per 30-foot row		Remarks for 1930
		1930	Average 6 years	
		lb.	lb.	
Copenhagen Market	First	None	61	Frozen after germinating
Copenhagen Market	Second	None	54	Frozen after germinating
Copenhagen Market	Third	19	50	Row not complete (5 heads)
Copenhagen Market	Fourth	41	48·5	Many split
Copenhagen Market	Fifth	45	24	Badly split
Danish Ballhead	First	None	33	Frozen after germinating
Danish Ballhead	Second	None	46	Frozen after germinating
Danish Ballhead	Third	None	30	Did not develop
Danish Ballhead	Fourth	None	15	Did not develop
Danish Ballhead	Fifth	33	12	Row not complete (5 heads)

Seeding of two varieties in open ground commenced April 12 and was followed by four sowings at ten-day intervals. Twelve degrees of frost on May 22 damaged the first three seedings. This confined the test to the last two seedings. Copenhagen Market, an early variety, is the most suitable for producing a fair crop under these conditions. The late seeding of Danish Ballhead, a late variety, did not allow sufficient length of season for this kind to mature. For a period of years the late seeding of Copenhagen Market or the early seeding of Danish Ballhead produced the most suitable sized heads for winter storage purposes.

CELERY—VARIETY TEST

The best three of the seven varieties tested, in order of merit, were, White Plume, Paris Golden Yellow and Early Blanching. The White Plume produced the largest plants averaging 1 pound 13 ounces per head. The seed was sown in flats on March 24. Germination was fair. The seedlings were pricked out on April 21 and planted in double rows, 6 inches apart, in prepared trenches 18 feet long, two feet wide and 18 inches deep. All varieties were well blanched.

CORN—VARIETY TEST

Of the varieties tested Sixty Day Golden is the outstanding variety. This variety seems well adapted to climatic conditions being early and producing high yields of good quality corn. Other varieties of merit are Sixty Day Makegood, Sunshine, Alpha, Early Malcolm and Burbank.

LETTUCE—VARIETY TEST

Seed of sixteen varieties was sown in the open ground April 22. Germination was good. Frost damaged many plants on May 22. Many of the headed varieties showed great tendency to run to seed under dry conditions. The best head varieties were Giant Crystal Head, Brittle Ice and Iceberg. The leaf varieties recommended are Grand Rapids and Black Seeded Simpson.

ONIONS

Eleven varieties including flat and Globe types were grown. The seed was sown in the open ground on April 21. Germination was fair. The seedlings were thinned to four inches apart on June 24 and were harvested on September 22. Largest yields were obtained from Large Red Wethersfield which produced 13 pounds per 30-foot row and Ailsa Craig which yielded 12½ pounds per 30-foot row.

PARSNIPS

Guernsey, a half long type, and Hollow Crown, a long type, were the two varieties tested. The Guernsey variety produced the highest yield. This type of parsnip is most suitable for dry land conditions, since it produces roots of more desirable shape and is more easily harvested than the long types.

PARSNIPS—DATES OF SEEDING

Seed of the Hollow Crown variety was sown at ten-day intervals commencing on April 25. The first sowing did not germinate till May 30 so that the early sowings escaped the May frosts. The earliest sowings produced the largest roots and highest yields.

PEAS—VARIETY TEST

Eleven varieties were sown. Germination was good but frost and wind damaged many of the seedlings so that good data on yields could be secured from only a few varieties. The highest yielding varieties in the order of merit are Lincoln, Fenland Wonder, Unica and Director.

PEAS—DISTANCE OF PLANTING

Three varieties, namely, Thomas Laxton, English Wonder and Stratagem were used for this test. The first two mentioned are early varieties and the last a late variety. Seeds of each variety were spaced one, two and three inches apart in the row respectively. The varieties Thomas Laxton and Stratagem were damaged by wind and frost. Good results were obtained from English Wonder, the highest yield 19½ pounds per 30-foot row being secured from the one-inch spacing.

RADISH—VARIETY TEST

Seven varieties which included different types were tested. For a period of years, the most outstanding variety is Icicle. This variety grows well under dry conditions and retains a mild flavour for a greater period of growth as compared with many other sorts which soon become unfit for table use after they have grown to suitable size.

SQUASH, PUMPKIN—VARIETY TEST

Bush Marrow was the best among the Squash and Large Cheese among the pumpkins. Ten other varieties of pumpkin and squash did not develop well due to the dry season.

TOMATO—VARIETY TEST

Twenty-six varieties were started in flats under glass on March 21. Seedlings were pricked into thumb pots during the second week of April. The plants were repotted twice as they developed. Good sturdy plants 12 inches high were

planted in the open on June 6. Two days later they were severely damaged by heavy winds, but nearly all recovered. The highest yield of ripe fruit was obtained from Woodward's Sensation which produced 34¼ pounds from 14 plants. The next best yield was obtained from Langportian which gave 28 pounds from 14 plants. The fruits of these two varieties are small but uniform and of good quality. Other varieties of merit are Pennsylvania State Earliana, Alacrity X Earlibell, Pink No. 1 and Pink No. 2.

POTATOES

Nearly all of the varieties listed are early maturing sorts. Due to the dry period in July many of the varieties were forced to maturity early in the season. Late rains caused many of the new tubers to sprout before the end of August. The varieties chiefly affected were Epicure, Houghton Rose, Netted Gem and Early Sunrise. Others were affected to a lesser degree.. Though all the seed was treated thoroughly with formaldehyde to control scab, most of the varieties were considerably affected by this disease with the exception of Netted Gem, Irish Cobbler and Early Sunrise, which are among the best white varieties. Early Ohio and Early Six Weeks are recommended among the red sorts.

POTATOES—RESULTS OF TEST OF VARIETIES

Variety	Yield per acre		Remarks
	1930	Average 7 years	
	bush.	bush.	
Epicure	113	306	Very early; fairly smooth
Houghton Rose	137	291	Rough shape
Carter Early Favourite	177	291	Early; smooth
Irish Cobbler	218	292	Early; fairly smooth
Wee McGregor	177	277	Early; smooth
Early Ohio	202	232	Early; smooth
Early Sunrise	177	*263	Early; very smooth
Gold Nugget	202	*261	Early; excellent shape
Early Six Weeks	202	*253	Early; smooth
Bovee	185	*233	Early; smooth
Netted Gem	121	*232	Late; smooth
Bliss Triumph (Unit 15)	194	*222	Early; excellent shape

*Indicates three-year average.

VARIETY TEST OF VEGETABLES

The variety test of vegetables is conducted on summer-fallow land. Approximately ten tons of well rotted manure is applied to the soil and ploughed under during the summer-fallow year. No artificial irrigation is used except for the celery variety test. The table indicates several of the best varieties of each kind of vegetable grown under the above mentioned conditions for the past five years.

VARIETY TEST OF VEGETABLES FOR A NUMBER OF YEARS

Kind and variety	Number of years grown	Average yield per 30-foot row
Beans—		lb.
Wax—		
Hodson Long Pod	5	7·56
Wardwell Kidney	5	7·12
Round Pod Kidney	5	5·93
Green—		
Masterpiece	5	6·25
Stringless	5	5·37
Bountiful	5	6·50

VARIETY TEST OF VEGETABLES FOR A NUMBER OF YEARS—*Concluded*

Kind and Variety	Number of years grown	Average yield per 30-foot row
Beets—		
Round—		
Detroit Dark Red	4	63·0
Half Long—		
Improved Dark Red	4	61·7
Flat: Early Flat Egyptian	4	26·0
Borecole or Kale—		
Tall—Tall Scotch Curled	4	82·0
Short—Dwarf Scotch Curled	4	53·0
Cabbage—		10 average heads
Early—		
Glory of Enkhuizen (Early)	5	114·2
Succession	5	99·5
Copenhagen Market	5	70·2
Mid Season—		
Kildonan	5	91·8
Brandon Market	5	71·6
Late—Danish Ballhead	5	74·5
Carrot—		Average per 30-foot row
Long—Chantenay	4	59·0
Half Long—Nantes Half Long	4	53·0
Short—Oxheart	4	69·9
Celery—		
White Plume	5	0·9
Paris Golden Yellow	5	1·0
Corn—		Average 54 hills
Alpha	4	98·0
60 Day Golden	4	70·0
Lettuce—		10 average heads
Leaf—		
Grand Rapids	4	14·2
Black Seeded Simpson	4	16·0
Head—		
Crystal Head	4	16·2
Iceberg	4	14·6
Onion—		
Red Wethersfield	4	22·5
Ailsa Craig	4	24·8
Yellow Globe Danvers	4	18·4
Parsnip—		
XXX Guernsey	4	36·9
Hollow Crown	4	33·6
Pea—		
Thos. Laxton	4	7·3
English Wonder	3	5·8
Stratagem	4	10·4
Potatoes—		Bushels per acre
White—		
Epicure	7	306
Irish Cobbler	7	292
Gold Nugget	3	261
Red—		
Early Ohio	7	232
Early Six Weeks	3	253
Bovee	3	233
Radish—		Bunches of 12
White Icicle	5	28
Saxa	4	25
Tomatoes—		Ripe fruit
Chalk's Early Jewel	4	14·9
John Baer	4	10·9
Bonny Best	4	11·4
Pink No. 1	4	27·4
Pink No. 2	4	12·4
Alacrity	4	14·1

ORNAMENTALS

TREES AND SHRUBS

Considerable winter-killing occurred chiefly among the Maple, Russian Poplar, Dogwood and Golden Willow. The Golden Willows chiefly affected were located in exposed positions.

The leaves fell from the Poplars early in August particularly where soil moisture was deficient. Leaf buds for the following year's growth were then well formed. Late rains in August caused many of these buds to leaf out. This new growth was later killed by fall frosts. These observations lead us to believe that a great deal of killing found among poplars in seasons following a dry year may be attributed to this cause. Where trees are spaced wide enough apart, area is provided to permit sufficient moisture being stored. This prevents trees from being forced to maturity too early in the season and lessens the damage by winter-killing.

For shelter belt purposes, trees should be planted four to six feet apart in rows and rows 12 to 16 feet apart. This is a good method to follow where seasons of insufficient rainfall are likely to occur. When this method is followed, cultivators must be used to control weeds.

The lilacs did not bloom so freely as in previous years, but an abundance of blossoms appeared on all spiraeas, Halimodendron argenteum (Salt bush), Russian olive, Honeysuckle and Potentilla. Some winter killing occurred as indicated in the table.

ORNAMENTAL SHRUBS

Variety	Winter-killing	Began to bloom	Bloom over
Ginnalian maple	Slight	May 20	June 18
Siberian pea tree	Nil	May 20	June 4
Woody caragana	Nil	May 18	May 30
Dwarf caragana	Nil	June 8	June 22
Common lilac	Nil	Did not bloom	
Josika lilac	Nil	May 26	June 4
Villosa lilac	Nil	June 15	June 27
Halimodendron	Nil	June 26	July 6
Spiraea oblongifolia	Nil	May 18	June 17
Spiraea sorbifolia	Slight	June 28	Aug. 24
Spiraea billardi	Nil	July 2	July 26
Spiraea arguta	Slight	May 24	June 7
Tartarian honeysuckle	Nil	May 28	June 10
Albert Regel honeysuckle	Nil	May 28	June 10
Japanese rose	Considerable	June 20	Aug. 24
Rosa rubrifolia	Slight	June 14	June 27
Russian olive	Nil	June 24	July 5
Shrubby cinquefoil	Nil	June 16	Aug. 10
Missouri currant	Nil	May 14	May 28
Siberian dogwood	Slight	May 8	June 20

PERENNIAL FLOWERS

All the perennials wintered well under the covering of six inches of strawy manure which was applied after the first heavy fall frost. The mulch was removed during the last week of April in the following year, except that which covered the peonies. The latter were uncovered during the second week of May. Many of the kinds and varieties bloom exceptionally well such as Peonies, Iris, Anchusa italica, Oriental Poppy, Gypsophila Paniculata, Aquilegia and Linum sibiricum. The time and duration of bloom are indicated in the table.

HERBACEOUS PERENNIALS

Variety	How wintered	Began to bloom	Bloom over
Anchusa italica opal	Medium	June 14	Aug. 14
Gypsophila paniculata	Well	July 7	Aug. 20
Iris	Well	June 10	July 4
Delphinium Tall Blue	Well	June 18	Aug. 21
Pyrethrum	Well	June 15	July 3
Linum sibiricum	Well	May 23	July 20
Lychnis chalcedonica	Well	June 24	Aug. 20
Papaver orientalis	Well	June 11	June 30
Pansy	Poor	—	—
Aquilegia (Columbine)	Well	June 4	July 6
Cerastium tomentosum	Medium	June 1	July 8
Lupinus mixed	Killed	—	—
Pinks	Well	June 20	Aug. 20
Geum	Killed	—	—
Campanula	Killed	—	—
Delphinium Belladonna seedling	Killed	—	—
Achillea, The Pearl	Well	July 4	Oct. 3
Peony mixed	Well	June 20	July 26

ANNUAL FLOWERS

The season was not favourable to annual flowers grown without artificial means of irrigation. A few varieties, however, grew and bloomed remarkably well under trying conditions. Among these were the Petunias, Stocks, Asters, Snapdragons and Shizanthus.

SWEET PEAS

Sixty varieties were sown in prepared hills spaced five feet apart each way. The hills were prepared by excavating holes eighteen inches wide and 18 inches deep. Six inches of rotted manure mixed with good soil was placed in the bottom of each hole and then filled within two inches of the surface with good soil. A saucer shaped depression was left at each hill so as to retain water. Seeds of one variety were sown in each hill. Poplar brush was used to support the vines. All but ten varieties germinated well. The first blooms appeared on July 12 and the flowering period continued for seven weeks when they were caught by frost. Varieties that made good showing are Youth, Mrs. T. Jones, Blue Bird, Jack Hobbs, Daffodil Improved, Picture, Joan Ryder, Fluffy Ruffles, Edna May Improved, Elegens and Deeper Hercules.

TULIPS

The season was very favourable to the growing of tulips. Bulbs which were planted on October 15, 1929, were mulched with 6 inches of rotted manure after the first heavy frost. The mulch was removed during the last week of April of the following year. Excellent blooms were obtained from the Darwin varieties such as the Rev. Ewbank, Edmée, Madame Krelage, Suzon and Baron De La Tonnaye. Some excellent blooms were obtained from bulbs planted in 1928. Vermillion Brilliant and Joost Van Vondel were among the best of these.

DAFFODILS

The daffodils did not bloom so freely as in previous years. The varieties which were planted in 1928 were more successful than those planted in 1929. Lack of moisture due to proximity to tall growing shrubs and a dry season was mainly responsible for the less favourable showing this year.

TREE FRUITS

Practically no trees were lost due to winter killing. Over 100 fruit trees were planted to replace those lost by winter killing during the winter of 1927 and 1928.

Plum cherries yielded an abundance of good sized fruit. Opata was particularly outstanding. Oka and Sapa fruited for the first time and give much promise of adaptability and future usefulness.

Many of the crab apple varieties bloomed freely but wind and heavy rain damaged the blooms so that only a few fruits developed.

A number of standard apples have been growing and surviving the winters since 1926 and 1928. These include such varieties as Hibernal, Patten Greening, Duchess, Blushed Caville, Charlamoff, Antonovka and Pine Grove Red.

TREE FRUITS—VARIETY TEST

Name	Position of tree	Received from	Age of tree when planted	Year planted	Year of first fruit	Yield 1930
		PLUM CHERRY HYBRIDS				
			years			lb. oz.
Opata	S–6	Morden	1	1926	1929	12 0
Opata	S–7	"	1	1926	1929	6 4
Opata	S–8	"	1	1926	1929	14 0
Opata	S–9	"	1	1926	1929	5 0
Opata	S–10	"	1	1926	1929	14 0
Opata	S–11	"	1	1926	1929	7 0
Opata	S–12	"	1	1926	1929	5 8
Opata	S–13	"	1	1926	1929	10 0
Opata	S–14	"	1	1926	1929	7 0
Sapa	U–7	Patmore	2	1926	1929	1 8
Oka	G–12	Morden	1	1928	1930	2 8
Oka	G–13	"	1	1928	1930	1 8
Oka	G–14	"	1	1928	1930	2 0
Mammoth	I–1	"	2	1926	1930	Few fruits
		CRAB APPLES				
Dolgo	K–2	Morden	1	1926	1929	Few fruits
Amur	K–10	"	1	1926	1929	Few fruits
Rosilda	G–2	"	1	1926	1926	Few fruits

BUSH FRUITS

RASPBERRY BUSHES

Winter protection was provided by bending down the canes and covering the tips with earth and then mulching the entire plantation with straw to a depth of one foot. Newman No. 23 and Fewthorn were winter-killed slightly. All other varieties wintered well, the best of which were Herbert, Sunbeam and Spineless. Yields of fruit were not heavy due to the dry season.

CURRANT BUSHES

Six bushes each of eleven varieties were subjected to yield test. Among the best yielding sorts are the following:—

Black Currants—Eagle, Kerry.

Red Currants—New Red Dutch O-2305, London Red.

White Currants—Climax White O-2339.

GOOSEBERRIES

The gooseberries wintered well, but yielded only small amounts of fruit due to the dry season. Of the three varieties tested Houghton produced the highest average yield of 2 pounds per bush.

STRAWBERRIES

Strawberry varieties wintered well under a one-foot mulch of straw. The season, however, was not favourable to the production of fruit. The berries were small and the yields light.

INSECT PESTS

Rose curculio or snout beetle.—A red bodied beetle about $\frac{1}{4}$ inch long found boring holes in young rosebuds, which mars or destroys the bloom. Controlled by hand picking and destroying both the beetle and the infested buds.

American Elm Aphis (Schozoneura americana).—Infestation bad. Controlled by picking and destroying infested leaves.

Caragana Blister Beetle (Lyatta nutalli).—Found damaging Caragana, Halimodendron and green beans. Controlled by spraying bushes with arsenate of lime and hand picking from green bean plants.

Oka plum bearing fruit, 1930.

MULCH PAPER EXPERIMENT

From experiments and observations of the past two years it would appear that mulch paper may find a use on kitchen gardens or small areas of market garden where earliness and high yields are sufficiently important to warrant the expense of buying and laying the paper.

No particular difficulty was experienced this year either in laying the paper or retaining it in place. Small furrows were opened at the same distance apart as the width of the paper. The edges of the paper were turned downward in the furrows and the soil thrown back so as to hold down the entire strip.

It was noticed that the paper did not always control weeds perfectly. In several rows weeds were found growing vigorously through the perforations which are presumably for the purpose of allowing rain water to penetrate the soil.

With some vegetables it was found that the use of the paper increased the rate of germination, due, no doubt to the fact that surface evaporation of moisture was lessened, thereby leaving more moisture for the germinating seeds.

RESULTS OF MULCH PAPER EXPERIMENT—SWIFT CURRENT, 1930

Crop	Mulch paper	Date planted	Date of germination	Germination	Number of days to germination	Per cent stand	First date used	Size	Yield per 20-foot row
									lb. oz.
Beans	No	April 23	May 27	Fair	34	5	July 12	Medium	.. ..
Beans	Yes	" 23	" 18	Irregular	25	15	" 10	Medium	1 8
Beets	No	" 23	" 14	Fair	21	40	" 20	Large	23 ..
Beets	Yes	" 23	" 10	Fair	17	40	" 18	Large	14 ..
Carrots	No	" 23	" 17	Fair	24	100	" 30	Medium	17 12
Carrots	Yes	" 23	" 17	Fair	24	75	" 26	Large	24 ..
Cabbage	No	May 26	.....	.....	.....	100	" 20	Medium	14 8 per 10 heads
Cabbage	Yes	" 26	.....	.....	.....	100	" 17	Medium	50 .. per 10 heads
Corn	No	April 23	May 16	Fair	23	100	Aug. 20	Large	2 4 8 edible cobs
Corn	Yes	" 23	" 10	Fair	17	100	" 12	Large	8 8 15 edible cobs
Cucumbers	No	" 23	.....	.....	.....	Nil	.....	.....	
Cucumbers	Yes	" 23	.....	.....	.....	Nil	.....	.....	
Onions	No	" 23	May 20	Fair	27	60	Sept. 2	Medium	3 ..
Onions	Yes	" 23	" 16	Fair	23	40	" 2	Medium	1 8
Parsnips	No	" 23	" 18	Fair	25	100	" 2	Small	13 12
Parsnips	Yes	" 23	" 17	Fair	24	100	" 2	Small to medium	16 4
Peas	No	" 23	" 12	Irregular	19	60	July 5	Medium	2 4
Peas	Yes	" 23	" 7	Fair	14	50	" 4	Large	2 12
Potatoes	No	" 23	.....	.....	.....	100	Aug. 4	Medium	25 ..
Potatoes	Yes	" 23	.....	.....	.....	100	July 28	Medium	30 ..
Tomatoes	No	June 5	.....	.....	.....	100	Aug. 19	Medium	7 ..
Tomatoes	Yes	" 5	.....	.....	.....	100	" 19	Large	13 4
Melons	No	April 23	.....	Nil	.....	Nil	.....	.....	
Melons	Yes	" 23	.....	Nil	.....	Nil	.....	.....	

CEREALS

The work in the Cereal Division has followed closely along lines established in earlier years. Standard varieties of wheat, oats, barley, rye, flax and peas have been compared for yield, quality, earliness and general adaptability in both fiftieth acre and rod-row plots. Likewise new introductions for the Central Farm and from other Stations have been tested by the same methods. Promising selections from standard varieties made in previous years have been closely compared with the varieties from which they were selected with a view to isolating superior strains.

Small quantities of Elite stock seed of Marquis wheat and Banner oats have been produced and larger quantities of registered seed have been grown for sale and for distribution to Illustration Stations.

ROD-ROW MACHINERY

Rod-row seeders which were supplied to the other Western Stations and the Central Farm in 1929 were somewhat improved and returned to the various Stations. Reports indicate that these machines gave reasonably good satisfaction. To supply demands for these seeders from institutions outside the Experimental Farms System, arrangements were made with the Vulcan Iron Works, Winnipeg, to manufacture fifteen seeders. The design of these latter machines closely followed that of the ones that had been made at this Station.

After several years of designing and testing, a small rod-row thresher was constructed in 1929 and tried out both at this Station and at the Rust Laboratory at Winnipeg. The thresher proved quite satisfactory. Consequently, in 1930, the Vulcan Iron Works was employed to manufacture eleven threshers for use on the other Prairie Stations, the Central Farm, the Charlottetown Station and the Rust Laboratory at Winnipeg.

During the harvest season of 1930, considerable time was spent in a further effort to design a satisfactory rod-row harvester. Some progress was made, but we cannot yet regard this problem as being nearly solved.

THE SEED PLANT

The seed plant, to which reference was made in last year's report, has been completed; cleaning machinery is installed and custom cleaning of farmers' seed grain is now being done. The plant has a total storage capacity for about 10,000 bushels of grain in 18 bins varying in capacity from 100 to 1,800 bushels each. Elevators and spouting are so arranged that seed may be transferred from any bin to the cleaning machinery and returned to any other bin, or seed may be delivered directly from cleaners to truck or wagon outside. All seed handling and cleaning equipment is accessible for cleaning, so as to reduce the chances of mixtures. A small motor-driven hammer mill is used to grind screenings and feed grain thereby lessening the chances of spreading weeds when feeds are removed from the plant.

SPRING WHEAT

In the following tables are presented data from the fiftieth acre wheat plots. Detailed data are given for 1930, and a summary table shows the standing of each variety for the years it has been under test:—

COMMON SPRING WHEAT—RESULTS OF TEST OF VARIETIES AND STRAINS 1930
1/50-acre plots triplicated—sown on fallow April 17

Variety	Date ripe	Height at harvest	Yield per acre	Weight per measured bushel at separator
		in.	bush.	lb.
Reliance	Aug. 6	33	28·7	60·5
Garnet	" 3	33	25·7	60·6
Ceres	" 6	37	24·6	59·8
Marquis Ott. 15	" 7	35	24·4	60·3
Kitchener	" 8	35	24·2	58·2
Red Bobs Supreme	" 3	34	22·7	58·8
Marquis 10 B	" 7	36	22·6	60·3
Early Red Fife Ott. 16	" 5	34	22·5	58·2
Reward 269/368/26	" 3	31	22·1	64·5
Red Fife Ott. 17	" 5	31	21·6	58·3
Reward Ott. 928	" 3	33	20·0	63·5
Renfrew	" 5	36	19·6	54·7

TEST OF SPRING VARIETIES GROWN ON FALLOW—FIVE-YEAR AVERAGE—YEARS 1926-1930 INCLUSIVE

Variety	Number of days maturing	Average length of straw including head	Weight per measured bushel	Yield per acre	Comparative yield in per cent of Marquis
		in.	lb.	bush.	
Red Bobs Supreme	109	36·4	59·8	32·9	106·1
Garnet Ott. 652	102	35·0	59·3	32·3	104·2
Kitchener	113	38·6	58·8	31·4	101·3
Marquis Ott. 15	110	37·4	59·6	31·0	100·0
Kubanka Ott. 37	112	45·6	60·9	29·7	95·8
Early Red Fife Ott. 16	112	38·0	58·9	29·1	93·9
Reward Ott. 928	104	35·0	62·5	28·1	90·6

In attempting to valuate varieties of wheat, yield per acre, although very important is not the sole consideration. Conformity to market requirements and commercial grades is important. In Southwest Saskatchewan, where combines are being increasingly used to harvest wheat, strength of straw and non-shattering properties are very important. Provided yield or other useful qualities are not unduly sacrificed, early maturity is very valuable both to enable the variety to escape early frosts and to permit of earlier harvesting. In looking over the summary of data it will be observed that some varieties under test slightly out-yield Marquis. Others are earlier in maturity. But when all qualities possessed by any one variety are compared with those of Marquis, it will be found that for most districts of Southwest Saskatchewan, Marquis is the most suitable variety.

DURUM WHEAT—TEST OF VARIETIES AND STRAINS
1/50-acre plots duplicated—sown on fallow April 17

Accession number	Variety	Date ripe	Height at harvest	Yield per acre	Weight per measured bushel at separator
			in.	bush.	bush.
133	Mindum	Aug. 6	45·5	23·2	62·5
24	Kubanka Ott. 37	" 8	49·5	21·6	61·3

Over a period of nine years the average yield per acre of Kubanka Durum wheat has been almost exactly the same as that of Marquis for the same years. The average yield of Mindum, another variety of Durum wheat, for the last four years has been so little above that of Kubanka that it cannot be said there is any material difference between them. In view of the fact that Durum wheats are later to mature, weaker in straw and almost invariably command a lower price on the market than Marquis, there seems no reason whatever for any farmer in Southwest Saskatchewan to consider growing Durums in place of common wheat.

OATS

OATS—TEST OF VARIETIES AND STRAINS

1/50-acre plots triplicated—sown on fallow April 18

Variety	Date ripe	Height at harvest	Yield of grain per acre	Weight per measured bushel at separator
		in.	bush.	lb.
Gopher	Aug. 2	29	60·1	37·5
Legacy	" 2	34	59·9	38·2
Markton	" 2	32	56·2	37·5
Longfellow Ott. 478	July 30	33	53·3	39·3
Leader	Aug. 1	35	52·1	30·5
Victory	" 1	30	51·1	35·6
Gold Rain	" 2	39	50·0	39·3
Banner Ott. 49	" 1	32	48·8	34·3
Cole	July 29	34	48·1	35·6
Gerlach	Aug. 2	32	48·0	37·3
Abundance	" 1	33	41·7	34·8
O.A.C. 72	" 1	34	41·4	35·5
Daubeney Ott. 47	July 27	27	40·8	36·7
*Laurel Ott. 474	" 29	31	37·7	46·5

*Hulless.

OATS—TEST OF VARIETIES AND STRAINS

1/50-acre plots triplicated—grown on fall ploughed oat stubble

Variety	Date ripe	Height at harvest	Yield of grain per acre	Weight per measured bushel at separator
		in.	bush.	lb.
Gopher	July 25	21	25·0	37·3
Gold Rain	" 29	28	24·7	35·5
Legacy	" 28	28	24·5	36·5
Markton	" 27	26	24·5	35·3
Cole	" 27	26	22·0	34·8
Gerlach	" 27	26	21·7	33·5
Longfellow Ott. 478	" 27	24	21·5	36·8
Banner Ott. 49	" 30	24	20·5	32·2
Daubeney Ott. 47	" 27	22	20·3	35·5
Laurel Ott. 474	" 27	23	19·7	47·2
O.A.C. No. 72	" 28	25	19·7	30·2
Leader	" 30	25	17·8	27·3
Victory	" 30	24	17·2	32·6
Abundance	" 30	23	14·9	34·3

TEST OF OAT VARIETIES GROWN ON FALLOW—FIVE-YEAR AVERAGE—YEARS 1926-1930 INCLUSIVE

Variety	Number of days maturing	Average length of straw including head	Weight per measured bushel	Yield per acre	Comparative yield in per cent of Banner
		in.	lb.	bush.	%
Longfellow Ott. 478	98	38·0	36·6	60·9	103·4
Gerlach	99	37·8	35·2	60·2	102·2
Victory	98	37·4	36·2	58·9	100·0
Banner Ott. 49	99	37·8	33·8	58·9	100·0
Gold Rain	99	40·2	38·0	58·4	99·1
Cole	92	33·8	34·4	57·7	98·0
Leader	99	37·8	32·5	56·4	95·7
Abundance	99	38·4	35·9	53·9	91·5
O.A.C. No. 72	99	39·8	34·5	53·1	90·1
Daubeney Ott. 47	90	32·4	35·4	52·3	88·8
*Laurel Ott. 477	97	35·2	48·2	48·9	83·0

*Hulless.

TEST OF OAT VARIETIES GROWN ON STUBBLE—FIVE-YEAR AVERAGE—YEARS 1926-1930 INCLUSIVE

Variety	Number of days maturing	Average length of straw including head	Weight per measured bushel	Yield per acre	Comparative yield in per cent of Banner
		in.	lb.	bush.	%
Cole	90	29·2	35·0	38·4	100·3
Banner Ott. 49	97	29·0	33·9	38·3	100·0
Gold Rain	97	29·2	36·1	37·1	96·9
Leader	97	29·2	32·2	36·9	96·3
Longfellow Ott. 478	96	29·6	36·5	36·8	96·1
Victory	97	28·8	33·0	36·2	94·5
Daubeney Ott. 47	90	27·4	35·8	35·7	93·2
Gerlach	97	29·0	33·8	35·1	91·6
O.A.C. No. 72	97	30·4	32·6	31·0	80·9
Abundance	98	28·8	33·4	30·1	78·6
Laurel Ott. 477	95	27·0	48·1	27·6	72·1

*Hulless.

In comparing the different varieties of oats under test, it should be noted that the standing is not the same on fallow and stubble land. This should be considered in selecting the variety which is to be grown. An examination of the yield data by years shows that different varieties are at the top in different years, hence too much importance should not be attached to high yields for varieties which have been under test only one or two years. Two newly introduced varieties, Gopher and Legacy show comparatively high yields for the short time they have been under test. They are both somewhat earlier in maturing than the standard varieties such as Banner and Victory. Earliness may possibly be the reason for the high standing of the new varieties in 1930. It was noted that early crops in general escaped to some extent the effects of the drought conditions that prevailed in July. In spite of the good showing of the new sorts this year, Banner must still be regarded as the standard variety for this district. It would be unwise to replace it with a variety which has been under test only two or three years.

BARLEY

Whether sown on fallow or on stubble land two varieties have consistently given high yields for a period of six to eight years, namely, Hannchen and Trebi. Hannchen is a two-rowed variety imported from Sweden where it originated as a selection out of the Austrian variety known as Hanna. Its most serious fault is its weakness of straw. Trebi was originally grown extensively on irrigation farms. It is a bearded six-rowed variety. It is somewhat difficult to remove the awns at threshing time, but has very strong stiff straw. Horn barley is a new introduction. It is a two-rowed bearded variety with longer and much stronger straw than Hannchen. Since this variety has not been tested very long, it is not recommended, though it yielded very high this year. For the production of feed Trebi seems to be the best variety available at present. It is of interest to note that in the comparatively dry season of 1930 the earliest varieties produced relatively high yields when sown on fallow. Apparently the moisture supply was sufficient to permit the early varieties to make nearly a normal development.

BARLEY—TEST OF VARIETIES AND STRAINS

1/50-acre plots triplicated—sown on fallow May 12, 1930

Accession number	Variety	Date ripe	Height at harvest	Yield of grain per acre	Weight per measured bushel at separator
			in.	bush.	lb.
74	Junior Ott. 471	July 29	34	28·1	53·3
67	Horn	Aug. 4	30	25·7	46·8
8	Albert Ott. 54	" 3	35	23·6	42·0
23	Trebi	" 3	33	22·7	38·5
15	Hannchen	" 4	29	22·3	45·3
66	Gold	" 8	29	21·4	48·3
16	O.A.C. No. 21	" 3	34	21·0	40·2
22	Charlottetown No. 80	" 8	29	17·9	46·2
9	Chinese Ott. 60	" 4	35	16·7	40·8
95	Star	" 8	30	16·6	40·3
21	Bearer Ott. 475	" 8	33	15·5	39·1
96	Duckbill Ott. 57	" 12	30	15·2	48·0
94	Plumage Archer	" 12	28	9·9	47·0

BARLEY—TEST OF VARIETIES AND STRAINS

1/50-acre plots triplicated—sown May 12, on fall ploughed barley stubble

Accession number	Variety	Date ripe	Height at harvest	Yield of grain per acre	Weight per measured bushel at separator
			in.	bush.	lb.
15	Hannchen	Aug. 9	26	18·7	44·7
23	Trebi	" 2	33	16·9	39·0
67	Horn	" 4	26	13·4	47·3
74	Junior Ott. 471	July 29	26	13·2	51·0
9	Chinese Ott. 60	Aug. 3	33	12·4	40·7
16	O.A.C. No. 21	" 4	31	12·1	40·2
22	Charlottetown 80	" 6	28	11·6	47·5
8	Albert Ott. 54	" 3	27	11·6	40·0
66	Gold	" 6	25	8·7	48·0
	O.A.C. 21 (Sask.)	" 3	30	8·7	40·2
10	Duckbill Ott. 57	" 9	24	7·8	44·8
	Barks	" 8	25	7·0	41·8
21	Bearer Ott. 475	" 8	26	5·3	40·5

TEST OF BARLEY VARIETIES GROWN ON FALLOW—FIVE-YEAR AVERAGE—YEARS 1926-1930 INCLUSIVE

Variety	Number of days maturing	Average length of straw including head	Weight per measured bushel	Yield per acre	Comparative yield in per cent of O.A.C. No. 21
		in.	lb.	bush.	%
Hannchen	95	30·6	48·4	42·2	109·0
Gold	98	30·0	48·8	41·5	107·2
O.A.C. No. 21	93	38·2	44·1	38·7	100·0
Albert Ott. 54	90	36·2	45·1	36·9	95·3
Charlottetown No. 80	98	32·4	48·9	36·6	94·6
Junior Ott. 471	90	33·0	57·5	36·4	94·0
Chinese Ott. 60	95	38·2	46·3	34·9	90·2
Duckbill Ott. 57	97	32·0	47·6	34·9	90·2
Bearer Ott. 475	99	35·0	43·1	34·5	89·1
Trebi	95	33·6	42·2	20·1	51·9

TEST OF BARLEY VARIETIES GROWN ON STUBBLE—FIVE-YEAR AVERAGE—YEARS 1926-1930 INCLUSIVE

Variety	Number of days maturing	Average length of straw including head	Weight per measured bushel	Yield per acre	Comparative yield in per cent of O.A.C. No. 21
		in.	lb.	bush.	%
Albert Ott. 54	89	31·0	45·3	27·9	106·5
Hannchen	93	26·4	47·2	26·7	101·9
O.A.C. No. 21	91	30·2	46·1	26·2	100·0
Chinese Ott. 60	93	31·6	45·6	25·4	96·9
O.A.C. No. 21 Sask.	92	31·8	46·2	24·9	95·0
Trebi	91	25·7	42·9	23·7	90·4
Charlottetown No. 80	94	25·2	48·7	23·4	89·3
Gold	95	24·2	49·4	23·3	88·9
Junior Ott. 471	88	24·8	52·1	23·0	87·8
Bearer Ott. 475	95	27·4	42·6	21·2	80·9
Duckbill Ott. 57	95	26·0	47·8	19·8	75·6

FALL RYE

FALL RYE—TEST OF VARIETIES AND STRAINS

Sown on Fallow

Accession number	Variety	1924	1925	1926	1927	1928	1929	1930	Average for years grown
		bush.	bush.	bush.	bush.	bush.	bush.	bush.	bush.
8	Rosen Sask. No. 299	41·3	26·7	44·9	62·6	11·2	9·7	13·0	29·9
6	Advance Sask. No. 668	42·9	25·8	41·8	60·9	13·6	7·3	11·3	29·1
9	Dakold No. 955	46·6	21·5	43·1	58·8	13·8	7·9	10·0	28·8
10	Common	.....	25·6	47·7	58·4	13·4	10·1	12·6	28·0
5	Swedish Sask. No. 669	44·1	21·1	38·8	56·7	11·2	9·2	12·3	27·6
3	North Dakota No. 295	.....	.....	.....	.....	.....	.....	12·5	12·5

Among the winter rye varieties that have been under test since 1924, no striking differences in yield can be observed. In 1922 Rosen rye winter-killed somewhat seriously but since that time it has not differed materially in that respect from Dakold which is regarded as the standard variety for Saskatchewan conditions.

FLAX

FLAX—TEST OF VARIETIES AND STRAINS

Comparative yields for a number of years

Accession number	Variety	1923	1924	1925	1926	1927	1928	1929	1930	Average for years grown
		bush.	bush.	bush.	bush.	bush.	bush.	bush.	bush.	bush.
2	Novelty Ott. 53	16·5	16·7	14·0	14·9	8·3	16·7	5·1	12·7	13·1
4	Common	19·3	15·4	14·5	15·0	13·9	14·0	3·2	8·0	12·9
1	Premost	16·5	14·3	12·7	14·5	8·9	15·8	4·6	9·8	12·1
6	Linota	.....	.....	.....	.....	.....	16·7	4·2	11·6	10·8

Four varieties were sown on fallow on May 12 at the rate of 30 pounds per acre. Soil moisture was good at the time of seeding and good stands were obtained. Novelty Ott.-53 has yielded only slightly better than the common commercial kind of flax. The seed, however, is much more uniform in size and colour, the colour being a pale brown. Linota is regarded in some districts as being wilt resistant. This variety has yielded almost equally with Novelty when the yields are compared for the past three years.

FIELD PEAS

TEST OF VARIETIES

The varieties grown in this test during the past eight years have been grown either on corn or fallow land. The yields this year are higher than those of 1929, but considerably lower than the eight-year average. Mackay Ott.-25 is the highest yielding variety. It seems to yield considerably higher than other varieties in the test during dry seasons as indicated by the results of 1929 and 1930.

FIELD PEAS—RESULTS OF TEST OF VARIETIES AND STRAINS

Comparative yields for a number of years

Variety	Yield per acre								Average for years grown	Average for Canada field peas for same years	Comparative yield in per cent of Canada field peas for same years
	1923	1924	1925	1926	1927	1928	1929	1930			
	bush.	bush.	bush.	bush.	bush.	bush.	bush.	bush.	bush.	bush.	%
Mackay Ott. 25	32·9	.....	.....	26·4	39·0	34·6	15·4	19·6	28·0	21·1	132·7
Carleton	28·3	44·0	31·4	25·3	39·8	32·9	8·9	10·5	27·6	23·4	117·9
Arthur Ott. 18	.....	41·9	25·1	28·0	26·7	38·9	11·6	15·2	26·8	24·4	109·8
Golden Vine (Sask.)	18·5	42·2	26·2	19·6	34·1	34·6	11·0	13·6	25·0	23·4	106·8
Canada Field	17·0	36·7	24·5	20·4	32·6	36·0	8·8	11·6	23·4	23·4	100·0
Golden Vine	13·0	31·4	29·1	25·8	36·2	27·9	8·9	12·7	23·1	23·4	98·7
Chancellor Ott. 26	19·2	.....	26·2	17·9	31·5	19·4	12·7	13·6	20·1	21·6	93·0

FORAGE CROPS

Two dry seasons in succession have had the effect of greatly reducing both stands and yields of such crops as Western rye grass, brome grass, sweet clover and alfalfa. Poor catches were obtained on many plots in 1929 so that even had 1930 been a good season small yields would have resulted from the 1929 seed-

Seed corn, Gehu variety, grown in 1930.

ings. It is important for farmers to note the fact biennial crops in particular are always subjected to the risks of two years of adverse weather conditions, while annual crops must contend with the adversities of one season only. Moreover the annual crops can be fortified against drought by seeding them on summer-fallow, thereby greatly increasing their chances of success. In 1930 annual forage crops such as oats or oats and peas seeded on fallow gave very good yields, thus providing feed in the dry year when feed is most urgently needed.

CORN VARIETIES

The season was more favourable to maturing of corn than to production of high yields of fodder. Late maturing varieties therefore did not yield well. The earlier maturing flint varieties while yielding a little less fodder per acre produced greatly increased percentages of ripe or near-ripe corn, which enhances the feeding value. Of the tall-growing varieties Minnesota No. 13 Double Cross is the most desirable from the standpoint of both fodder and maturity. This variety is generally free of suckers and bears the cobs high up on the stem which makes it easy to harvest. For pasture or hogging off purposes any northern grown seed of the flint varieties such as Squaw, Gehu, Burleigh County Mixed and Manitoba Amber can be recommended.

CORN—TEST OF VARIETIES FOR FODDER PRODUCTION

Variety	Source	Maturity at harvest	Yield per acre	
			Green weight	Dry weight
			tons	tons
Manda	O. Will	Silk	5·83	1·56
Falconers	McKenzie's	Late milk	5·34	1·37
Twitchell's Pride	C.E.F.	Glazed	4·71	1·33
Northwestern Dent, Crookston Strain	Northrupp King	Glazed	4·31	1·18
Smoky Dent	McDonald's	Silk	5·25	1·17
Extra Early	N.W. Dent-Steele Briggs	Glazed	3·91	1·11
Northwestern Dent, N.K. Strain	Northrupp King	Glazed	4·14	1·08
Payne's White Dent	Exp. Farm, Brandon	Glazed	4·31	0·99
Minnesota No. 13, Haney Strain	McKenzie's	Glazed	4·04	0·98
King's Cross	Northrupp King	Glazed	4·19	0·98
Pioneer White Dent	O. Will	Late milk	4·11	0·97
Minnesota No. 13	Northrupp King	Glazed	4·05	0·92
Quebec No. 28	McDonald College	Late dough	3·75	0·92
Manitoba Amber	Man. Agric. College	Ripe	3·08	0·91
Minnesota No. 13 Double Cross	Northrupp King	Near ripe	3·88	0·89
Minnesota No. 13 Recombination	Northrupp King	Near ripe	3·40	0·87
Early Squaw	E. C. Rhodes, Maple Creek	Ripe	2·57	0·83
Northwestern Dent Brandon strain	Brandon, Man.	Ripe	2·91	0·81
Square Deal	O. Will	Near ripe	2·91	0·81
Manalta	Man. Agric. College	Ripe	2·11	0·81

SUNFLOWERS—TEST OF VARIETIES OR STRAINS GROWN ON FALLOW

Variety	1930			Eight-year average	
	Height at harvest	Green weight	Dry weight	Green weight	Dry weight
	in.	tons	tons	tons	tons
Russian Giant	75	20·44	4·11	14·84	2·70
Mammoth Russian	90	22·00	3·80	13·96	2·99
Manchurian	65	18·93	3·31	14·05	2·48
Manteco	57	19·13	3·09	13·28	2·07
Black	45	16·88	3·07	13·02	2·21
Mixed	90	18·22	3·02	12·72	1·97
Ottawa No. 76	58	17·87	2·99	13·21	2·19
Mennonite	65	8·59	1·95	9·88	1·81

When reckoned on a gross tonnage basis, the tall growing varieties of sunflowers have produced much greater yields than the smaller earlier maturing sorts. However, when compared on a basis of dry matter production, which is a better indication of feeding value, the differences between varieties are not so great. On either basis, however, the Mammoth Russian is the highest yielding variety.

ANNUAL FODDER CROPS

In selecting fodder crops for Southwestern Saskatchewan the three factors, average yield per acre, certainty of supply and feeding value are of greatest importance. Other important considerations are cost and availability of seed supplies, necessity for special machinery or methods which might increase the cost. The residual effects of some fodder crops on succeeding grain crops may sometimes be an important matter. Within certain limits quality and other considerations may be disregarded in favour of certainty and quantity. In times of extreme feed shortage other things are largely disregarded in an effort to secure any fodder that will provide maintenance for the live stock.

Two consecutive years of drought in South Central Saskatchewan have focused attention on the feed problem to such an extent that many farmers are making plans to change their crops and take other measures that may offer hope of improving the feed supplies. In view of this situation records of yields, covering periods of from five to nine years, for various fodder crops grown at this Station, will be of interest. The tables that follow present such records:—

ANNUAL FODDER CROPS

1/50-acre plots triplicated—sown on fallow

Crop	Height	Stand	Date cut	Yield per acre cured weight 12 per cent moisture basis
	in.			tons
Spring rye, oats and feeder barley	36	Thick	July 30	2·35
Mackay peas	36	Thick	Aug. 4	2·29
Banner oats and feeder barley	36	Thick	July 30	2·28
Golden Vine peas	36	Thick	Aug. 4	2·21
Feeder barley and peas	37 and 32	Thick	July 30	2·14
Spring rye and Banner oats	38	Thick	" 30	2·11
Feeder barley	36	Thick	" 30	2·10
Banner oats and peas	36 and 30	Thick	" 30	1·92
Common spring rye	39	Thick	" 30	1·91
Spring rye and peas	41 and 33	Thick	" 30	1·89
Banner oats	35	Thick	" 30	1·67
Siberian millet	24	Thick	Aug. 4	1·57
Common millet	24	Normal	" 4	1·27
Hungarian millet	24	Normal	" 4	1·13
Hog millet	26	Thin	" 4	0·83

COMPARISON OF YIELDS OF ANNUAL, BIENNIAL AND PERENNIAL CROPS ON A BASIS OF DRY MATTER PER ACRE

Crop	Number of years grown	Average yield for years grown	Yield of Banner oats for same years	Comparative yields in per cent of Banner oats for same years
		tons	tons	tons
Annual Hay Crops Grown on Fallow—				
Banner oats	9	1·98	1·98	100
Feeder barley	4	2·10	1·92	109
Spring rye	8	1·69	2·14	79
Field peas	5	1·50	1·86	81
Banner oats and peas	8	1·95	2·14	91
Feeder barley and peas	4	2·03	1·92	106
Spring rye and peas	4	1·78	1·92	93
Hungarian millet	7	1·63	2·08	78
Hog millet	7	1·28	2·11	61
First Year Hay Crops Sown alone on Fallow—				
Brome grass	6	1·13	1·67	68
Western rye grass	6	1·19	1·67	71
Arctic sweet clover	6	1·03	1·67	62
Grimm alfalfa	7	0·67	1·74	38
Brome and western rye grass	8	1·61	2·14	75
Brome and Western rye grass (preceding crop of fall rye)	6	1·08	1·67	65
First Year Hay Crops Sown alone on Spring Ploughing—				
Brome and Western rye grass	7	0·83	1·74	48
White sweet clover	7	0·82	1·74	47
Corn and Sunflowers sown on fallow—				
Northwestern Dent corn	7	1·84	1·74	106
Russian Giant sunflowers	8	2·52	1·94	129
Corn and Sunflowers Sown on Wheat Stubble—				
Northwestern Dent or Minnesota No. 13 corn	9	1·20	1·98	60
Russian Giant Sunflowers	9	1·67	1·98	84

In the first table will be found the detailed data for annual fodder crops grown on fallow in 1930. In the second table average yields of annual fodder crops, as well as grasses, legumes, corn and sunflowers are given. In order that comparisons may be made, the table indicates whether crops were seeded on fallow or stubble land. The yields are all reduced to a basis of absolute dry weight and in the final column all yields are stated as a percentage of the yield of oat green feed.

It will be noticed that some of the grasses are reported as having been sown alone on fallow, while others were sown alone on spring ploughing. These seedlings required three and two years respectively to produce one crop. In the case of annual crops seeded on fallow two years are required to produce one crop. This means that the yields of annual fodder sown on fallow are comparable with the yields of sweet clover or brome and western rye grass seeded alone on spring ploughing. Where grasses and sweet clover have been sown with a grain crop on either fallow or stubble, failures have been so frequent that their average yields have little value.

It is at once apparent that oats and Feeder Barley or mixtures of those crops with peas far exceed the grasses and clovers in average yield. Moreover, it is important to remember that a failure of the oats to produce a stand and make some crop that could be harvested has not yet occurred at this Station. During the same time failures of grasses and sweet clover to make sufficient stands to produce profitable crops, even with good moisture, have been common. This does not mean that oats or any other crop can be relied upon to produce a crop regardless of moisture supply. It merely indicates that the seed-

ing of oats almost invariably makes a stand sufficient to use all available moisture thereby producing the greatest feed supply permitted by climatic conditions.

The grasses and clovers have not only produced low average yields of fodder as compared with the yields of oats, but the averages are made up of a few good crops and many thin weedy crops. The uncertainty of securing adequate stands is a factor which must make the farmer cautious about greatly increasing his acreage of grass and sweet clover or depending too much on these crops as reliable sources of feed supply.

Sunflowers planted on summer-fallow have given very good yields and few failures have been experienced. But the fact that sunflowers must be ensiled by the use of expensive machinery and labour at a time that often conflicts with the wheat harvest makes this crop unsatisfactory from the economic point of view. Corn has been subject to the same type of failure as grasses and sweet clover in that stands have been very subject to damage by wireworms, rabbits, gophers and climatic conditions. The labour and machinery costs are also high.

In the matter of residual effects the only effect so far observed at this Station has been that grain crops directly following crops of grass and sweet clover have been poorer than following wheat. When grass and clover sod has been given one full year of fallow, the grain crop has been about equal to that produced on an ordinary fallow.

All things considered it seems advisable for most farmers in this part of Saskatchewan to continue to depend mainly on oats for feed and limit the acreage of grasses and sweet clover to small areas of low lying, or otherwise favoured, land.

TEST OF MISCELLANEOUS GRASSES
Sown without nurse crop on fallow

Variety	Yield per acre cured hay 12 per cent moisture	
	First year crop 1929	Second year crop 1930
	tons	tons
Western rye (Commercial)	1·33	1·02
Crested wheat grass (Sask.)	1·33	1·33
Brome (Commercial)	1·30	1·02
Western rye (Grazier)	1·25	0·96
Crested wheat grass (N.D.)	1·09	1·21
Crested wheat grass (Clarke)	1·02	1·13
Meadow fescue	0·52	Failed
Poa crocata	0·47	1·02
Canada blue grass	0·40	1·00
Nodding brome	0·36	Failed
Timothy (Commercial)	0·33	Failed
Orchard grass	0·23	Failed
Kentucky blue grass	0·23	0·64
Red top	0·13	Failed

Reasonably good stands of brome, Western rye and Crested wheat grass were obtained in 1928 which was a favourable year for germinating seeds. Only fair stands were secured from such smaller seeded varieties as meadow fescue, Kentucky blue grass, timothy and red top. Two dry years followed which resulted in comparatively low yields even for grasses sown alone on fallow. The month of June in 1930 revived the crop so that the better established varieties gave fair returns as a second-year crop. The highest yielding variety, Crested wheat grass yielded a total of 2·66 tons of cured hay per acre for the first and second year crop. Since it required three years to grow these crops the average yield per year was 0·89 tons per acre with no nurse crop returns.

Comparisons with the table below, which gives the results of seeding grasses and clovers with different nurse crops, will at once indicate that there is much less certainty of getting a stand with any nurse crop than without. In all grass and clover seeding experiments, depth of seeding seems to be an important factor. If the soil is kept in a firm condition and grasses and clovers are seeded very shallow, the chances of getting a stand are very much improved. It has often been possible to get satisfactory stands by broadcasting the seed on the surface and pressing it into the soil by means of a cultipacker. Grass and clover seeds are so small that if they are "seeded to moisture" they are likely to be too deep to ever emerge. The small seeds must

Depth of seeding brome grass.

depend upon surface moisture for germination. If they are near the surface they are in a position to germinate and establish seedlings during the brief time in which moisture and temperature conditions may be favourable.

GRASSES AND LEGUMES SOWN WITH VARIOUS NURSE CROPS
1/100-acre plots triplicated

Nurse crop	Yield of cured hay per acre 12 per cent moisture content			
	1930		Average 3 years	
	Brome, Western rye, alfalfa	White sweet clover	Brome, western rye, alfalfa	White sweet clover
			tons	tons
Wheat	Failed	Failed	0·22	0·51
Barley	Failed	Failed	0·23	0·39
Flax	Failed	Failed	0·25	0·49
Spring rye	Failed	Failed	0·39	0·83
Alone	*Very thin	Very thin	0·45	0·91

*Yields not obtainable due to weedy condition of stand.

WESTERN RYE—TEST OF STRAINS

Sown alone on fallow—1/100-acre plots—quadruplicated

Strain	Yield per acre cured hay—1930 12 per cent moisture		Four-year average per acre	Three-year average per acre
	First year crop	Second year crop	First year crop	Second year crop
	tons	tons	tons	tons
Commercial (check)	0·85	0·82	1·68	0·69
Ottawa 7	0·72	0·90	1·59	0·79
Ottawa 10	0·43	0·89	1·37	0·65
Ottawa 14	0·57	0·75	1·39	0·68
Commercial (check)	0·77	0·84	1·42	0·57
Ottawa 51	0·51	0·87	1·39	0·66
Ottawa 65	0·46	0·73	1·39	0·52
Ottawa 78	0·72	0·84	1·53	0·59
Commercial (check)	0·86	0·82	1·65	0·58
Ottawa 96	0·55	0·64	1·44	0·52
Ottawa 99	0·72	0·95	1·69	0·69
Ottawa 124	0·74	0·88	1·83	0·86

Nine strains and one commercial lot of western rye grass are seeded each year. The rotation followed is fallow, seed grass, hay, hay. This gives all seedings the best possible opportunity to produce maximum yields. Good stands of grass have always been obtained and the first year hay crops have generally yielded well. Second year crops, especially in dry seasons, have been light. Seeding the grasses on clean fallow land has to a large extent eliminated weed competition as an adverse factor in getting a stand. This is, of course, not a practice that may be followed on farms, but it seems to be the only sure method of getting stands that will permit of accurate comparisons of strains.

POULTRY

No expansion has been made in the poultry plant this year, but all buildings have been painted and the old yards broken up and summer-fallowed in preparation for reseeding next spring.

The flock now consists of 300 laying hens and pullets and stock of 15 cockerels for the next breeding season.

Five incubators with a combined capacity of 1,250 eggs were used in the 1930 hatching season. In order to have fresh eggs for setting, the incubators were set in pairs and the odd machine was used to provide extra space for pedigree work at hatching time. A total of 3,279 eggs were set from which there were hatched 1,739 chicks. One thousand of the chicks were kept on the Station and 739 sold as day-old chicks chiefly to farmers in the surrounding districts. In addition to the day-old chicks 1,185 hatching eggs were sold and 200 were distributed to Illustration Stations. This service seems to be appreciated by those who take advantage of it and it is quite evident that the sale of surplus chicks and eggs from the Station flock is having a material effect on the quality of the poultry in the district.

During the summer and early autumn the chicks which were reared on the Station were carefully culled with the result that only 150 of the pullets were retained to go into the laying pens. Some of the best of the pullets not required to maintain the flock were sold to farmers and the others sold on the market. Over 60 cockerels were retained for sale as breeding stock and twenty of these have now been disposed of.

Before the birds were put into winter quarters blood samples were taken and sent to the Poultry Division at the Central Farm for pullorum test. Thirty-four reactors were found in 600 birds.

The following table shows the production and egg weights of some of the best pullets during the 1929-1930 season.

RECORD OF 1929-1930 PULLETS

Birds	Record	Egg weight
	eggs	ounces
17	206	24
38	205	24
41	201	24
44	227	24
58	227	24
61	208	24
74	207	25
86	207	25
94	223	24
95	206	24
104	207	24
110	211	24
115	236	25
126	235	24
141	235	24